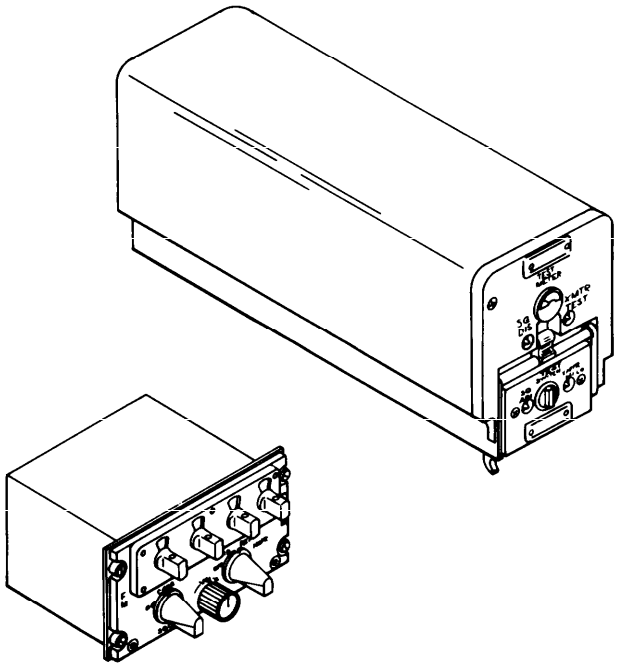
TM 11-5820-670-30

TECHNICAL MANUAL

AVIATION INTERMEDIATE MAINTENANCE MANUAL



PRINCIPLES OF OPERATION PAGE 1-4

PERFORMANCE TESTS PAGE 2-2

TROUBLESHOOTING PAGE 2-50

ALINEMENT/ADJUSTMENTS PAGE 2-126

REPAIR AND REPLACEMENT PAGE 2-150

RADIO SET AN/ARC-131 (NSN 5821-00-937-4686)

HEADQUARTERS, DEPARTMENT OF THE ARMY

13 SEPTEMBER 1985

5 SAFETY STEPS TO FOLLOW IF SOMEONE IS THE VICTIM OF ELECTRICAL SHOCK

1 DO NOT TRY TO PULL OR GRAB THE INDIVIDUAL

2 IF POSSIBLE, TURN OFF THE ELECTRICAL POWER

3 IF YOU CANNOT TURN OFF THE ELECTRICAL POWER, PULL, PUSH, OR LIFT THE PERSON TO SAFETY USING A WOODEN POLE OR A ROPE OR SOME OTHER INSULATING MATERIAL

4 SEND FOR HELP AS SOON AS POSSIBLE

5 AFTER THE INJURED PERSON IS FREE OF CONTACT WITH THE SOURCE OF ELECTRICAL SHOCK, MOVE THE PERSON A SHORT DISTANCE AWAY AND IMMEDIATELY START ARTIFICIAL RESUSCITATION

WARNING

HIGH VOLTAGE

is used in the operation of this equipment.

DEATH ON CONTACT

may result if personnel fail to observe safety precautions.

Never work on electronic equipment unless there is another person nearby competent in administering first aid. When aided by operators, the technician must warn them about dangerous areas.

Whenever possible, the power supply to the equipment must be shut off before beginning work on the equipment. Take particular care to ground every capacitor likely to hold a dangerous potential. When working inside the equipment, after the power has been turned off, always ground every part before touching it.

Be careful not to contact high-voltage connections or 115 vac input connections when installing or operating this equipment.

Whenever the nature of the operation permits, keep one hand away from the equipment to reduce the hazard of current flowing through vital organs of the body.

WARNING

Do not be misled by the term “low voltage”. Potentials as low as 50 volts may cause death under adverse conditions.

WARNING

Dangerous potentials, which could cause severe electrical shock, exist at several points throughout this equipment. When equipment is operated with the covers removed, do not touch exposed connections, components, or dc input connections. Some transistors have voltages present on their cases.

WARNING

Do not operate radio set if any cables are frayed or other physical damage is evident. Electrical shock to personnel could result.

WARNING

Exercise care when lifting the radio set to avoid personal injury. The receiver-transmitter weighs 25 pounds.

WARNING

Adequate ventilation should be provided while using TRICHLOROTRIFLUOROETHANE. Prolonged breathing of vapor should be avoided. The solvent should not be used near heat or open flame; the products of decomposition are toxic and irritating. Since TRICHLOROTRIFLUOROETHANE dissolves natural oils, prolonged contact with skin should be avoided. When necessary, use gloves which the solvent cannot penetrate. If the solvent is taken internally, consult a physician immediately.

For Artificial Respiration, refer to FM 21-11.

Technical Manual

No. 11-5820-670-30

HEADQUARTERS
DEPARTMENT OF THE ARMY
Washington, DC, 13 September 1985

AVIATION INTERMEDIATE MAINTENANCE MANUAL

RADIO SET AN/ARC-131
(NSN 5821-00-937-4686)

REPORTING ERRORS AND RECOMMENDING IMPROVEMENTS

You can help improve this manual. If you find any mistakes or if you know of a way to improve the procedures, please let us know. Mail your letter, DA Form 2028 (Recommended Changes to Publications and Blank Forms), or DA Form 2028-2 located in the back of this manual direct to: Commander, US Army Communications-Electronics Command and Fort Monmouth, ATTN: AMSEL-ME-MP, Fort Monmouth, New Jersey 07703-5007. A reply will be furnished direct to you.

			Page
CHAPTER 1		INTRODUCTION	1-1
Section	I	General Information	1-1
	II	Equipment Description	1-3
	III	**Principles of Operation**	**1-4**
CHAPTER 2		MAINTENANCE	2-1
Section	1	Repair Parts, Special Tools, and TMDE	2-1
	II	**Performance Tests**	**2-2**
	III	**Troubleshooting**	**2-50**
	IV	**Alinement and Adjustment Procedures**	**2-126**
	V	**Repair and Replacement Procedures**	**2-150**
APPENDIX A		REFERENCES	A-1
	B	EXPENDABLE SUPPLIES AND MATERIALS LIST	B-1
GLOSSARY			Glossary 1
INDEX			Index 1
FOLDOUTS			Located in Rear of Manual

* This manual supersedes TM 11-5820-670-34 Direct Support and General Support (Aviation Intermediate) Maintenance Manual Radio Set AN/ARC-131, 16 February 1978.

HOW TO USE THIS MANUAL

This manual is designed to help you maintain Receiver-Transmitter, Radio RT-823/ARC-131 and Control, Radio Set C-7088/ARC-131 which are components of Radio Set AN/ARC-131.

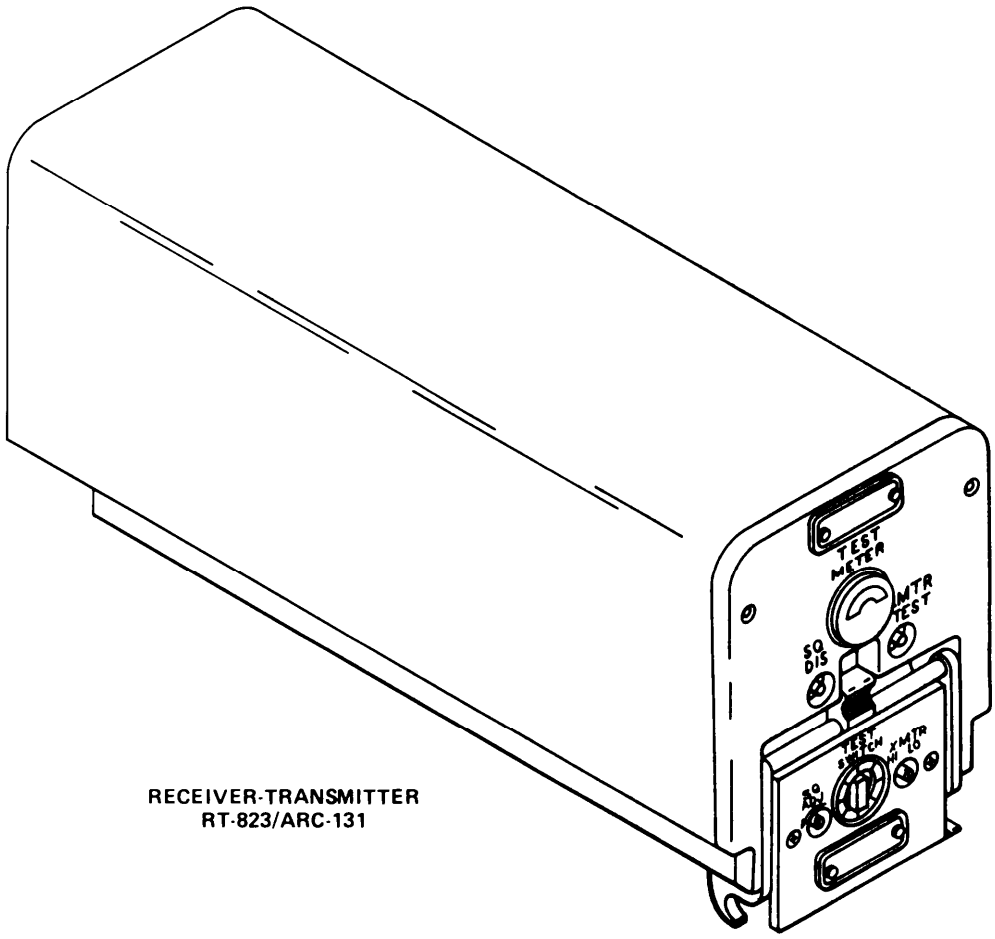
A front cover index is provided for quick reference to important information contained in this manual. Each item appearing on the front cover is boxed and identified by topic, with the page number where the information is located.

Paragraphs in this manual are numbered by chapter and order of appearance within a chapter. A subject index appears at the beginning of each section to help you find the exact paragraph you are looking for.

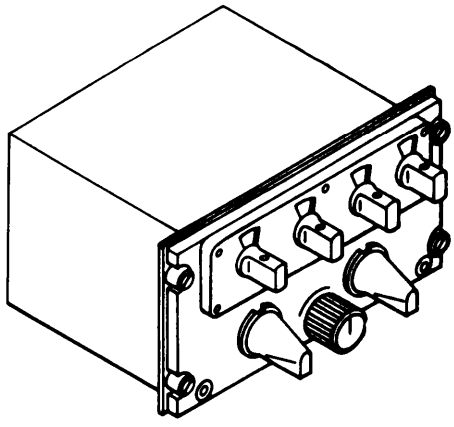
Measurements in this manual are given in both US standard and metric units. A metric to US standard conversion chart can be found in the back of this manual.

There are warnings at the beginning of this manual. Before doing maintenance on the equipment, learn the warnings and always follow safety procedures and precautions.

Step by step procedures with illustrations give you all the necessary information needed to maintain the equipment. The steps must be followed in exact sequence. Do not attempt any shortcuts.



RECEIVER-TRANSMITTER
RT-823/ARC-131



RADIO SET CONTROL
C-7088/ARC-131

EL1AT231

Radio Set AN/ARC-131

CHAPTER 1

INTRODUCTION

Subject	Section	Page
General Information	I	1-1
Equipment Description	II	1-3
Principles of Operation	III	1-4

OVERVIEW

This chapter will familiarize you with Radio Set AN/ARC-131. It contains general information about the equipment, references to pertinent forms and publications, equipment specifications, and principles of operation.

Section I GENERAL INFORMATION

Subject	Para	Page
Scope	1-1	1-1
Maintenance Forms, Records, and Reports	1-2	1-1
Reporting Equipment Improvement Recommendations (EIR)	1-3	1-2
Consolidated Index of Army Publications and Blank Forms	1-4	1-2
Destruction of Army Electronics Materiel to Prevent Enemy Use	1-5	1-2
Administrative Storage	1-6	1-2
Nomenclature Cross-Reference List	1-7	1-2
Safety, Care, and Handling	1-8	1-3

1-1. SCOPE.

Type of Manual: Direct support maintenance manual.

Equipment Names and Model Numbers: Receiver-Transmitter Radio RT-823/ARC-131 and Control, Radio Set C-7088/ARC-131, parts of Radio Set AN/ARC-131.

Purpose of Equipment: To provide two-way, voice communication between aircraft in flight and aircraft and ground stations, frequency modulated (fm) in the 30.00 to 75.95 MHz frequency range.

1-2. MAINTENANCE FORMS, RECORDS, AND REPORTS.

REPORT OF MAINTENANCE AND UNSATISFACTORY EQUIPMENT

Department of the Army forms and procedures used for equipment maintenance will be those prescribed in DA Pam 736-750 as contained in Maintenance Management Update.

REPORT OF PACKAGING AND HANDLING DEFICIENCIES

Fill out and forward SF 364 (Report of Discrepancy (ROD)) as prescribed in AR 735-11-2/DLAR 4140.55/NAVMATINST 4355.73A/AFR 400-54/MCO 4430.3F.

1-2. MAINTENANCE FORMS, RECORDS, AND REPORTS. (CONT)

DISCREPANCY IN SHIPMENT REPORT (DISREP) (SF 361)

Fill out forward Discrepancy in Shipment Report (DISREP) (SF 361) as prescribed in AR 55-38/ NAVSUPINST 4610.33C/AFR 75-18/MCO P4610.19D/DLAR 4500.15.

1-3. REPORTING EQUIPMENT IMPROVEMENT RECOMMENDATIONS (EIR).

If your Radio Set AN/ARC-131 needs improvement, let us know. Send us an EIR. You, the user, are the only one who can tell us what you don't like about your equipment. Let us know why you don't like the design. Put it on an SF 388 (Quality Deficiency Report). Mail it to: Commander, US Army Communications-Electronics Command and Fort Monmouth, ATTN: AMSEL-ME-MP, Fort Monmouth, New Jersey 07703-5007. We'll send you a reply.

1-4. CONSOLIDATED INDEX OF ARMY PUBLICATIONS AND BLANK FORMS.

Refer to the latest issue of DA Pam 310-1 to determine whether there are new editions, changes, or additional publications pertaining to the equipment.

1-5. DESTRUCTION OF ARMY ELECTRONICS MATERIEL TO PREVENT ENEMY USE.

Destruction of Army electronics materiel to prevent enemy use shall be in accordance with TM 750-244-2.

1-6. ADMINISTRATIVE STORAGE.

Administrative storage of equipment issued to and used by Army activities will have preventive maintenance performed in accordance with the PMCS charts before storing. When removing the equipment from administrative storage, the PMCS shall be performed to ensure operational readiness. Refer to TM 11-5820-870-12 for PMCS.

Administrative storage of equipment shall be done in accordance with TM 740-90-1, Administrative Storage of Equipment. Disassembly and repacking of equipment for shipment or limited storage are covered in TM 11-5820-670-12.

1-7. NOMENCLATURE CROSS-REFERENCE LIST.

This list contains names used throughout this manual in place of official nomenclature.

COMMON NAME	OFFICIAL NOMENCLATURE
control unit	Control, Radio Set C-7088/ARC-131
headset/microphone	Headset H-78/AIC
radio set	Radio Set AN/ARG-131
receiver-transmitter	Receiver-Transmitter RT-823/ARC-131

1-8. SAFETY, CARE, AND HANDLING.

Observe all warnings, cautions and notes in this manual. This equipment can be extremely dangerous if these instructions are not followed. Ensure the following caution is observed as well.

CAUTION

Receiver-transmitter of radio set is compact and heavy. Use caution when handling it. Serious damage could result if mishandled and dropped.

Section II EQUIPMENT DESCRIPTION

Subject	Para	Page
General	1-9	1-3
Equipment Characteristics, Capabilities, and Features	1-10	1-3
Differences Between Models/Silicon Versions	1-11	1-3

1-9. GENERAL.

This section contains overall information about the Radio Set AN/ARC-131. It includes references to publications that provide detailed equipment description and data, and coverage of major differences between radio sets. There is only one model of the radio set but functional modules in the receiver-transmitter may contain either germanium or silicon semiconductors.

1-10. EQUIPMENT CHARACTERISTICS, CAPABILITIES, AND FEATURES.

Equipment characteristics, capabilities, and features of Radio Set AN/ARC-131 and its parts are found in TM 11-5820-670-12.

1-11. DIFFERENCES BETWEEN MODELS/SILICON VERSIONS.

This paragraph contains information covering redesigned receiver-transmitter (rt) modules using silicon semiconductors in lieu of germanium devices. Operation of the radio set is not affected by interchange of modules in the receiver-transmitter.

MODULES CONTAINING SILICON SEMICONDUCTORS

Modules equipped with silicon semiconductors are identified by the suffix letter A. For example, A8100A denotes a silicon version transmitter modulator. The A8100 is the germanium version of the same module.

It is possible that radios in field might be equipped with a combination of germanium and silicon modules in the receiver and transmitter sections, as listed below.

Mixer Assembly A1400A
Local Oscillator A1500A
Tuner Power Supply A1600A
CRS Oscillators A2000A
Voltage Regulator A2100A
CRS Harmonic Generator A3100A
CRS Balanced Mixer A3200A
CRS Second Mixer A3300A
CRS First and Second IF. Amps A3400A
CRS Limiter A3500A
CRS Hunt Discriminator A3600A
CRS Phase Discriminator A3700A
Master Oscillator A6300A
Buffer Amplifier A6400A
11.5 MHz Modulator A8100A
First and Second IF. Amps A8300A
Hunt Generator A8400A

1-11. DIFFERENCES BETWEEN MODELS/SILICON VERSIONS. (CONT)

INTERCHANGEABILITY OF MODULES

Germanium and silicon modules may be used together in the same radio with the following exceptions. Only germanium versions of the following modules should be used:

First and Second IF. Amps A4100)
IF. Amps and Limiter A4200
Squelch Amplifier A5200
Squelch Filter A5300
Audio and Squelch Preamplifier A4300
AF Amplifier A5400

ALINEMENT DIFFERENCES

With the following exception, there is no difference in germanium and silicon version alinement procedures.

Transmitter 11.5 MHz Modulator A8100/A8100A

Rearrangement of the circuit board in the A8100A silicon version has moved the shorting point for modulator testing and alinement. Additionally, the polarity of the variable capacitance diodes has been reversed, eliminating the 180-degree phase shift in the modulation. This permits compatible interface with various data systems.

Section III PRINCIPLES OF OPERATION

Subject	Para	Page
General	1-12	1-6
RECEIVE MODE		
Receiver Signal Flow	1-13	1-7
Local Oscillator AFC/Crystal Reference System	1-14	1-8
CRS Balanced Mixer A3200	1-15	1-10
CRS Second Mixer A3300 and Crystal Switch A2000	1-16	1-11
CRS First and Second IF. Amplifier A3400/CRS Third IF. Amplifier and Limiter A3500	1-17	1-14
CRS Hunt Discriminator A3600, CRS Phase Discriminator A3700, and Reference Oscillator A2000	1-18	1-15
Time Delay Circuit P/O Module A2100	1-19	1-19
Gearbox Assembly A9700	1-20	1-20
RF Control Assembly P/O Module A4500 (Receive Mode)	1-21	1-21
Antenna Tuning and Protection Module A1100	1-22	1-22
First RF Amplifier Module A1200	1-23	1-22
Second RF Amplifier Module A1300	1-24	1-23
Mixer and Buffer Amplifier A1400 (Receive Mode)	1-25	1-23
Local Oscillator Module A1500	1-26	1-24
IF. Attenuator Module A4900 (Receive Mode)	1-27	1-26
First and Second IF. Amplifier A4100	1-28	1-26
Third, Fourth and Fifth IF. Amplifier, Limiter and Discriminator A4200	1-29	1-27
Audio and Squelch Preamplifier Module A4300	1-30	1-28
Audio Amplifier Module A5400 (Receive Mode)	1-31	1-28
Receiver Squelch Amplifier Module A5200 and Squelch Filter Module A5300 (Receive Mode)	1-32	

Subject	Para	Page
TRANSMIT MODE		
Transmitter Signal Flow	1-33	1-31
Master Oscillator Frequency Control Loop	1-34	1-33
Audio Mixer Module A8600	1-35	1-36
11.5 MHz Modulator Module A8100	1-36	1-36
First and Second IF. Amplifiers Module A8300	1-37	1-37
Phase Discriminator Module A8200	1-38	1-38
Hunt Generator Module A8400	1-39	1-39
Master Oscillator Module A6300	1-40	1-40
Buffer Amplifier Module A6400 and Regulator Assembly	1-41	1-41
Isolation Amplifier Module A6600	1-42	1-42
Mixer and Buffer Amplifier A1400 (Transmit Mode)	1-43	1-43
Hunt Cutoff Detector P/O Module A4200	1-44	1-44
Audio Amplifier Module A5400 (Transmit Mode)	1-45	1-45
Squelch Amplifier Module A5200 (Transmit Mode)	1-46	1-45
Automatic Gain Control (AGC)	1-47	1-45
RF Amplifier Assembly Module A6500	1-48	1-46
RF Control Assembly P/O Module A4500 (Transmit Mode)	1-49	1-48
HOMING MODE		
Homing Signal Flow	1-50	1-50
RF Control Assembly P/O Module A4500 (Homing Mode)	1-51	1-52
IF. Attenuator Module A4900 (Homing Mode)	1-52	1-53
Homer-Detector Amplifier Assembly A4800	1-53	1-54
RETRANSMIT MODE		
Retransmit Operation	1-54	1-58
POWER AND CONTROL CIRCUITS		
VHF Tuner Power Supply Module A1600	1-55	1-59
Voltage Regulator Assembly A2100	1-56	1-60
Power Supply Assembly A9500	1-57	1-60
Receiver-Transmitter IntraUnit Circuit Functioning	1-58	1-81
Control, Radio Set C-7088/ARC-131 Functioning	1-59	1-63
Radio Set AN/ARC-131 Interunit Circuit Details	1-60	1-68
Tuning System Radio Set AN/ARC-131	1-61	1-77

1-12. GENERAL.

This section contains information covering principles of operation of major electronic assemblies of the receiver-transmitter, beginning with the receiver. Material is presented in functional block diagram format, with supporting text which explains the operation of each electronic module in the radio.

Details pertaining to operation of most individual components in each module are not discussed in this section. instead, the text explains overall effect each module has on an incoming signal, and how the module contributes to the operation of the radio. Individual circuit details are in the foldouts in the back of this manual.

At the direct support maintenance level, electronic components within radio modules are not replaced. Because of this maintenance approach, this section generally does not discuss the performance of specific circuits and components such as diodes and transistors. In fact, it is not necessary to understand how circuits in a module operate to effectively troubleshoot or aline it. However, it is very important to know what a module actually does in order to perform signal checks at test points for the purpose of testing, troubleshooting, or alining the module.

This section also explains the principles of operation of the control unit and discusses the flow of signals between the control unit and the receiver-transmitter in various modes of operation.

To present the technician with an effective understanding of principles of operation, both simplified and detailed signal flow of all operational modes is in this section. First, an overview or simplified paragraph explaining signal flow for each mode is presented, followed by a detailed description of the operation of the modules in the particular mode.

Certain modules in the radio set operate in more than one mode; therefore, these modules are explained in paragraphs pertaining to the selected mode. This approach allows the technician to follow the signal flow through the modules of the radio set in each mode without interruption.

Discussion of the radio set operating in the retransmit mode is limited to an explanation of the control circuits when the radio is set for retransmit so as not to duplicate other areas of the manual. Explaining the signal flow through the modules when the radio is set for retransmit is not necessary since the rf flows through modules already discussed in the transmit and receive modes of operation.

1-13. RECEIVER SIGNAL FLOW.

A system block diagram showing receiver signal flow can be found on FO-1 in the back of this manual. Refer to the foldout while reading the text in this paragraph.

In the receive mode of operation, frequency modulated rf signals from the communications antenna are applied to reflectometer (1) and sidetone gate detector (2), in module A4500. Due to the low level of received signal, the reflectometer and sidetone gate detector will not operate; however, these stages will provide a path for the rf signal to flow to transmit/receive relay K4501.

In the receive mode, relays K4501 and K4502 are deenergized. When these relays are deenergized, frequency modulated rf is applied from the sidetone gate detector to the antenna tuning and protection circuits in module A1100 (3). The tuning circuits pass signals of the frequency to which the receiver is tuned and reject all other frequencies. The protection circuit contains a neon lamp which is used for attenuating high levels of rf power that may be entering the receiver from a nearby transmitter.

Low level signals leaving the antenna tuning and protection circuits enter first rf amplifier, module A1200 (4), for amplification. The signal is then applied to second rf amplifier, module A1300 (5) for further amplification.

Amplified rf is then applied to mixer module A1400 (6), where the signals are heterodyned (mixed) with the output of local oscillator module A1500 (7). The local oscillator generates frequencies of 41.50 MHz through 64.45 MHz, and is kept from drifting by the crystal reference system (crs). Crs (21) is covered in detail in paragraph 1-14. For all frequency settings on the control unit through gearbox assembly A9700 (20) in the (A) band range, 30 MHz through 52.95 MHz, the local oscillator runs exactly 11.5 MHz **above** the selected frequency. For all frequency settings on the control unit in the (B) band range, 53 MHz through 75.95 MHz, the local oscillator runs exactly 11.5 MHz **below** the selected frequency.

Mixer module A1400 (6) produces sum or difference frequencies as a result of the mixing process. All frequencies, except 11.5 MHz intermediate frequency, are rejected by band-pass filter FL4001 (9). In the receive mode, sum or difference frequencies entering if. attenuator module A4900 (8) from the mixer are not attenuated. Only in homing mode of operation are the signals attenuated. The 11.5 MHz if. from the mixer and if. attenuator is passed through band-pass filter FL4001 (9) and applied to first and second if. amplifiers module A4100 (10) for amplification.

Amplified if. from module A4100 (10) is filtered by band-pass filter FL4002 (11) to eliminate noise generated in the receiver and then applied, for further amplification, to third, fourth, and fifth if. amplifiers in module A4200 (12).

1-13. RECEIVER SIGNAL FLOW. (CONT)

The 11.5 MHz if. output from the fifth if. amplifier is applied to limiter module A4200 (13). The limiter clips the positive and negative peaks of the input signal to ensure an output of constant amplitude. If the limiter output is not of constant amplitude, a distorted audio output occurs from the discriminator in module A4200 (14).

The clipped if. modulated signal is applied to the discriminator from the limiter. The discriminator demodulates the frequency modulated if. signal and applies the resultant audio signal to the receiver audio and squelch preamplifier.

The receiver audio and squelch preamplifier module A4300 (15) is a three-stage, direct coupled, class A amplifier which amplifies the audio signal and applies it to audio amplifier module A5400 (16). The audio signal is amplified in the audio amplifier and applied to low-pass filter FL5501 (17) and squelch amplifier module A5200 (18). Unfiltered audio signals from audio amplifier module A5400 (16) are applied through relay K5501 to activate receiver squelch amplifier A5200 (18) and squelch filter A5300 (19).

The squelch amplifier, depending on the setting of the squelch switch on the control unit, applies or removes power from the receiver audio amplifier to squelch or unsquelch the radio set.

The squelch function is covered in greater detail in paragraph 1-32.

Audio signals below 3000 Hz pass through filter FL5501 and then are reapplied to the audio amplifier for further amplification. Audio signals are then coupled to the control unit and interphone amplifier where the headset/microphone is connected.

1-14. LOCAL OSCILLATOR AFC/CRYSTAL REFERENCE SYSTEM.

Correct operation of the receiver depends on an accurately controlled local oscillator whose frequency is maintained with minimal variation. At any frequency selected at the control unit, the Iocal oscillator is held to a tolerance of ± 3.5 kHz by the action of the crs. Therefore, the crs functions as an automatic frequency control (aft) loop.

Refer to the system block diagram (FO2) showing crs signal flow while reading the text in this paragraph.

The output of iocal oscillators (1) is applied to high-pass filter FL3002 (2) and then to balanced mixer A3200 (3). At the same time, 12 frequencies (1 to 12 MHz) are applied to the crs balanced mixer from crystal-controlled harmonic generator A3100 (4).

The inputs to balanced mixer A3200 are heterodyned, thereby producing 12 sum and difference frequencies. Two frequencies closest to 53 MHz are passed by band-pass filter FL3003 (5), while the other signals are attenuated. The two accepted frequencies are then applied to crs second mixer A3300 (6), and heterodyned with the output of interpolation oscillator (7).

Ten crystals are within interpolation oscillator (crystal switch A2000). Each crystal corresponds to a group of frequencies tunable at the control unit. When a frequency is selected, the radio's gear train also selects one of ten crystals, which precisely controls the frequency of the interpolation oscillator.

LOCAL OSCILLATOR AFC/CRYSTAL REFERENCE SYSTEM. (CONT)

The heterodyning process in crs second mixer A3300 (6) produces sum and difference frequencies. Two of the difference frequencies are very close to 5.625 MHz. The frequency closest to 5.625 MHz is coupled across a 5.625 MHz tuned tank within the second mixer, to first and second if. amplifiers A3400 (8). Other frequencies are greatly attenuated by the resonant tank circuit.

After amplification, the if. signals are filtered by FL3004 (9), which is sufficiently selective to attenuate any unwanted frequencies. The third if. amplifier and limiter A3500 (10) functions in a manner similar to that described in paragraph 1-29, covering amplifier and limiter A4200 stages.

Output from amplifier and limiter A3500 (10) is applied to the phase discriminator and hunt generator at the same time to coarse tune, then fine tune the local oscillator.

COARSE TUNING THE LOCAL OSCILLATOR

The output from amplifier and limiter A3500 is applied to band-pass filter FL3005 (11) to attenuate any unwanted frequencies which may have passed through the limiter. From the band-pass filter, the signals are applied to the hunt discriminator A3600 (12).

The hunt discriminator contains a triple tuned travis-type discriminator similar to the one used in module A4200 described in paragraph 1-29. Large deviations away from the discriminator's 5.625 MHz center frequency cause the discriminator to output a plus or minus dc signal with an ac component riding on it.

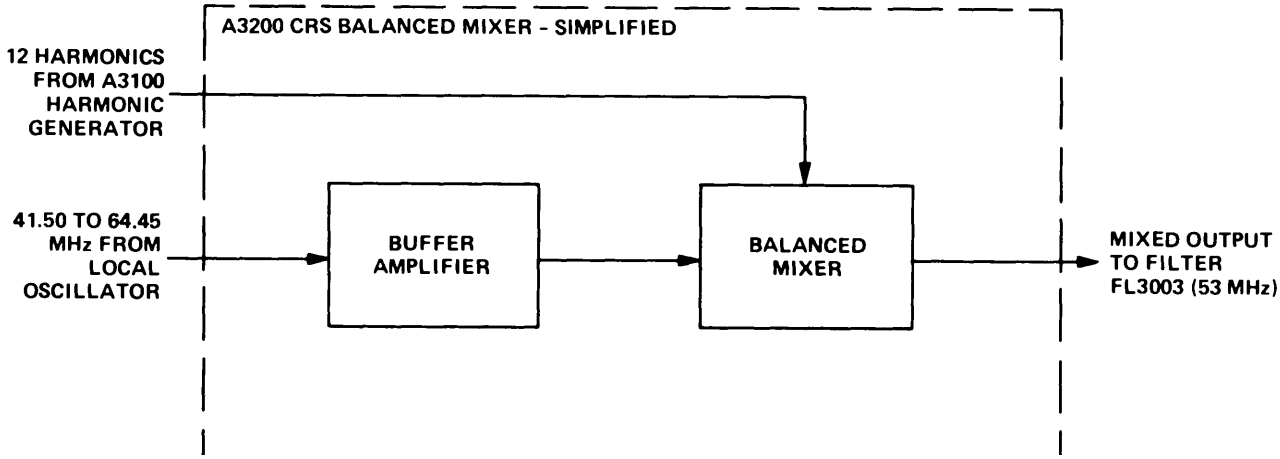
Both dc and ac outputs are applied to damping network (13), where the ac component is damped or attenuated. From the damping network, a positive or negative dc error signal is applied to local oscillator (1). The error signal biases the local oscillator close to the correct frequency by a hunting action. That is an initial large dc error signal followed by smaller error signal voltages until the oscillator is close enough to its correct frequency for the phase discriminator to begin fine tuning.

The hunt discriminator can coarse tune the local oscillator when its frequency error is within ±400 kHz.

FINE TUNING THE LOCAL OSCILLATOR

The hunt discriminator is sensitive to large errors in local frequency, while phase discriminator (14) responds to small errors. The phase discriminator compares the fixed output of reference oscillator (15) with the variable output of limiter (10). When two signals are of unequal frequency (due to incorrect local oscillator frequency), the phase difference causes the phase discriminator to output a dc error voltage which is applied to the local oscillator to bias it into correct frequency operation.

1-15. CRS BALANACED MIXER A3200.


A3200 CRS BALANCED MIXER - SIMPLIFIED
12 HARMONICS FROM A3100 HARMONIC GENERATOR
41.50 TO 64.45 MHz FROM LOCAL OSCILLATOR
BUFFER AMPLIFIER
BALANCED MIXER
MIXED OUTPUT TO FILTER FL3003 (53 MHz)

EL1AT090

The balanced mixer accepts inputs from the following two sources:

Local oscillator through high-pass filter FL3002
Harmonic generator

Local oscillator signals are applied to the mixer through a buffer amplifier to prevent loading down the local oscillator. Twelve frequencies, 1 to 12 MHz, are applied to the mixer with the local oscillator's output. The signals are heterodyned to produce four strong mixed output frequencies.

BALANCED MIXER OPERATING EXAMPLE

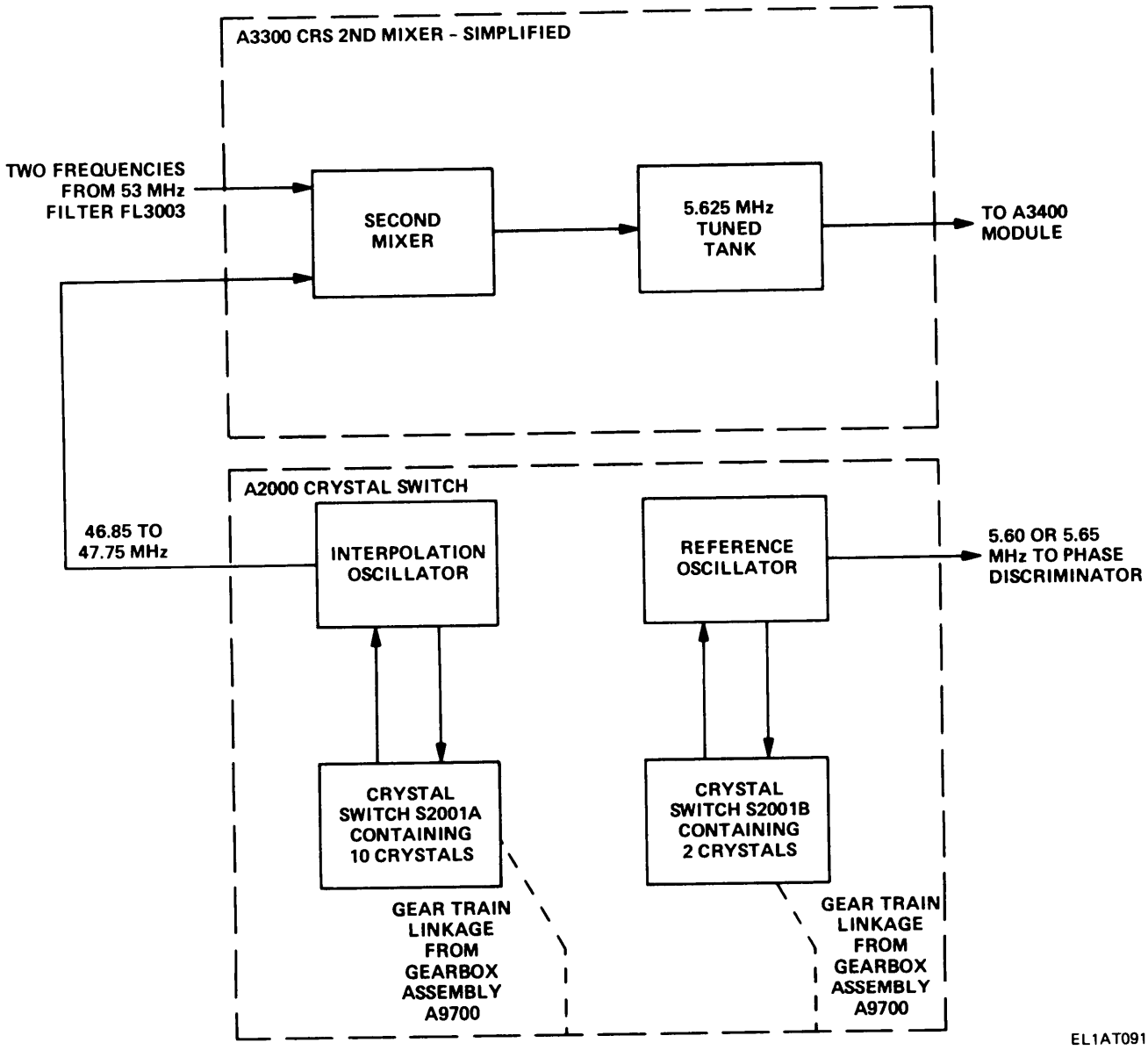
Assume the radio is tuned to 30 MHz, in which case the local oscillator runs to 41.50 MHz. The 41.50 MHz frequency is mixed with 12 signals generated by the harmonic generator, producing a mixed output containing each of the 12 harmonics, local oscillator frequency, and sum and difference frequencies listed below:

LOCAL OSCILLATOR FREQUENCY	HARMONIC GENERATOR FREQUENCY	SUM	DIFFERENCE
41.50 MHz	1 MHz	42.50 MHz	40.50 MHz
41.50 MHz	2 MHz	43.50 MHz	39.50 MHz
41.50 MHz	3 MHz	44.50 MHz	38.50 MHz
41.50 MHz	4 MHz	45.50 MHz	37.50 MHz
41.50 MHz	5 MHz	46.50 MHz	36.50 MHz
41.50 MHz	6 MHz	47.50 MHz	35.50 MHz
41.50 MHz	7 MHz	48.50 MHz	34.50 MHz
41.50 MHz	8 MHz	49.50 MHz	33.50 MHz
41.50 MHz	9 MHz	50.50 MHz	32.50 MHz
41.50 MHz	10 MHz	51.50 MHz	31.50 MHz
41.50 MHz	11 MHz	52.50 MHz	30.50 MHz
41.50 MHz	12 MHZ	53.50 MHz	29.50 MHz

1-15. CRS BALANCED MIXER A3200. (CONT)

Since the output of the balanced mixer is applied to a 53 MHz filter (FL3003), only two frequencies listed are close enough to the filter's band pass to reach the next crs module without substantial attenuation. These two frequencies are 52.50 and 53.50 MHz, which are applied to the second mixer.

1-16. CRS SECOND MIXER A3300 AND CRYSTAL SWITCH A2000.


A3300 CRS 2ND MIXER - SIMPLIFIED
TWO FREQUENCIES FROM 53 MHz FILTER FL3003
SECOND MIXER
5.625 MHz TUNED TANK
TO A3400 MODULE
A2000 CRYSTAL SWITCH
46.85 TO 47.75 MHz
INTERPOLATION OSCILLATOR
REFERENCE OSCILLATOR
5.60 OR 5.65 MHz TO PHASE DISCRIMINATOR
CRYSTAL SWITCH S2001A CONTAINING 10 CRYSTALS
CRYSTAL SWITCH S2001B CONTAINING 2 CRYSTALS
GEAR TRAIN LINKAGE FROM GEARBOX ASSEMBLY A9700
GEAR TRAIN LINKAGE FROM GEARBOX ASSEMBLY A9700
EL1AT091

1-16. CRS SECOND MIXER A3300 AND CRYSTAL SWITCH A2000. (CONT)

SECOND MIXER A3300

The second mixer performs a signal heterodyning function, mixing the output of the 53 MHz filter with a frequency from the interpolation oscillator.

Within the mixer module is a tuned tank circuit which couples the mixer's output to first and second if. amplifiers A3400. The tank circuit is tuned to resonate at 5.625 MHz so that frequencies near 5.625 MHz are coupled, while frequencies below and above tank's half-power points are severely attenuated.

CRYSTAL SWITCH A2000

Crystal switch A2000 contains two crystal-controlled oscillators, the interpolation oscillator and reference oscillator. The reference oscillator is discussed in paragraph 1-18.

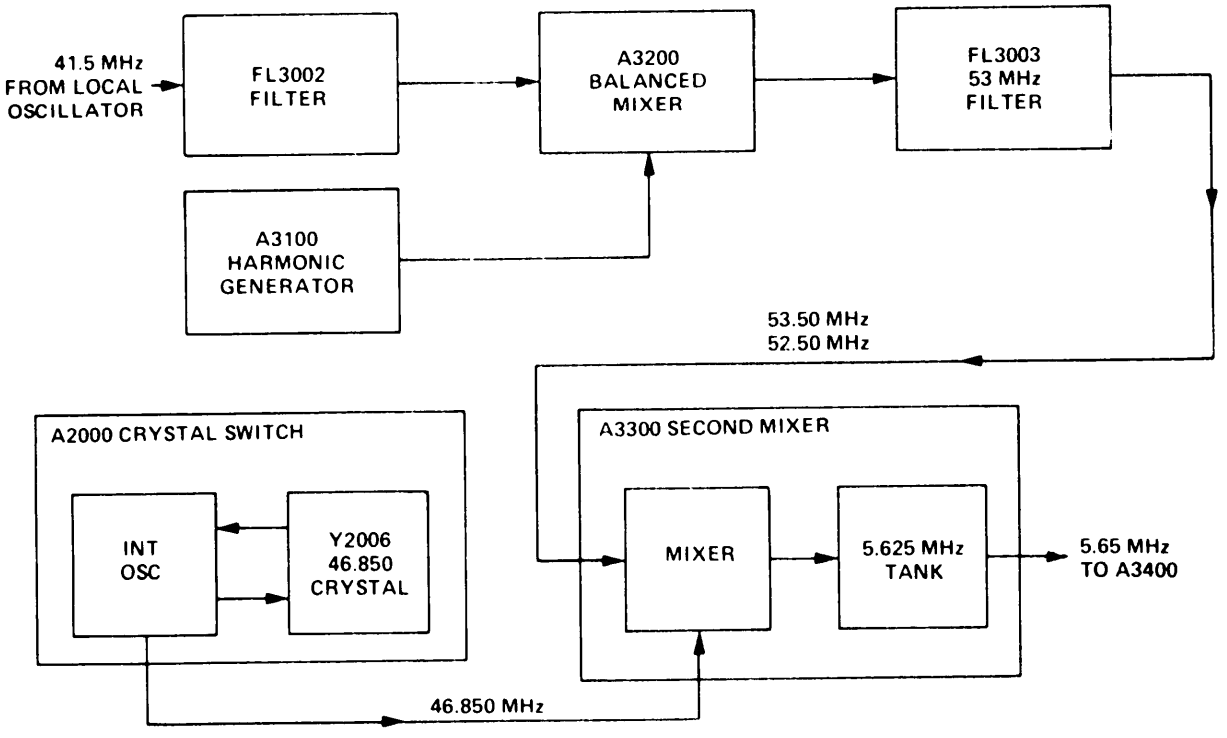
The interpolation oscillator's output frequency is controlled by one of 10 possible crystals which are selected by a switch through the action of the radio's gear train. Each crystal corresponds to two positions of the radio's tuning controls out of 20 possible 50 kHz increments that can be selected between whole-number frequencies. For example, in tuning from 30 to 31 MHz, the tuning controls select frequencies of 30.05, 30.10, 30.15, 30.20, 30.25, etc. The first two steps (30.05 and 30.10) correspond to a particular crystal in the crystal switch. The next two steps (30.15 and 30.20) have a different corresponding crystal. This pattern repeats itself until all 10 crystals have been individually selected. When the frequency selection controls reach 31.00 MHz, the same crystal is selected as was used for 30.00 MHz.

The following table lists 10 pairs of radio dial frequencies between each whole-number setting, the number of corresponding crystal, and the interpolation oscillator's frequency when that particular crystal is selected.

RADIO DIAL DECIMAL (kHz) FREQUENCY	CRYSTAL NUMBER	OSCILLATOR FREQUENCY
0.05 or 0.10	Y2007	46.950 MHz
0.15 or 0.20	Y2008	47.050 MHz
0.25 or 0.30	Y2009	47.150 MHz
0.35 or 0.40	Y2010	47.250 MHz
0.45 or 0.50	Y2005	47.350 MHz
0.55 or 0.60	Y2004	47.450 MHz
0.65 or 0.70	Y2003	47.550 MHz
0.75 or 0.80	Y2002	47.650 MHz
0.85 or 0.90	Y2001	47.750 MHz
0.95 or 0.00	Y2006	46.850 MHz

1-16. CRS SECOND MIXER A3300 AND CRYSTAL SWITCH A2000. (CONT)

SECOND MIXER AND CRYSTAL SWITCH OPERATING EXAMPLE – Radio Frequency Selector Switches Set to 30.00 MHz



Two strong frequencies enter the second mixer from the 53 MHz filter, 53.50 and 52.50 MHz. These signals are heterodyned with the output from the interpolation oscillator.

With the radio tuned to 30 MHz, crystal Y2006 is selected. This crystal sets the interpolation oscillator's output at 46.850 MHz. When 46.850 MHz is mixed with 53.50 and 52.50 MHz, several strong frequencies are produced. However, difference frequencies are closest to the 5.625 MHz resonant frequency of A3300 tank circuit.

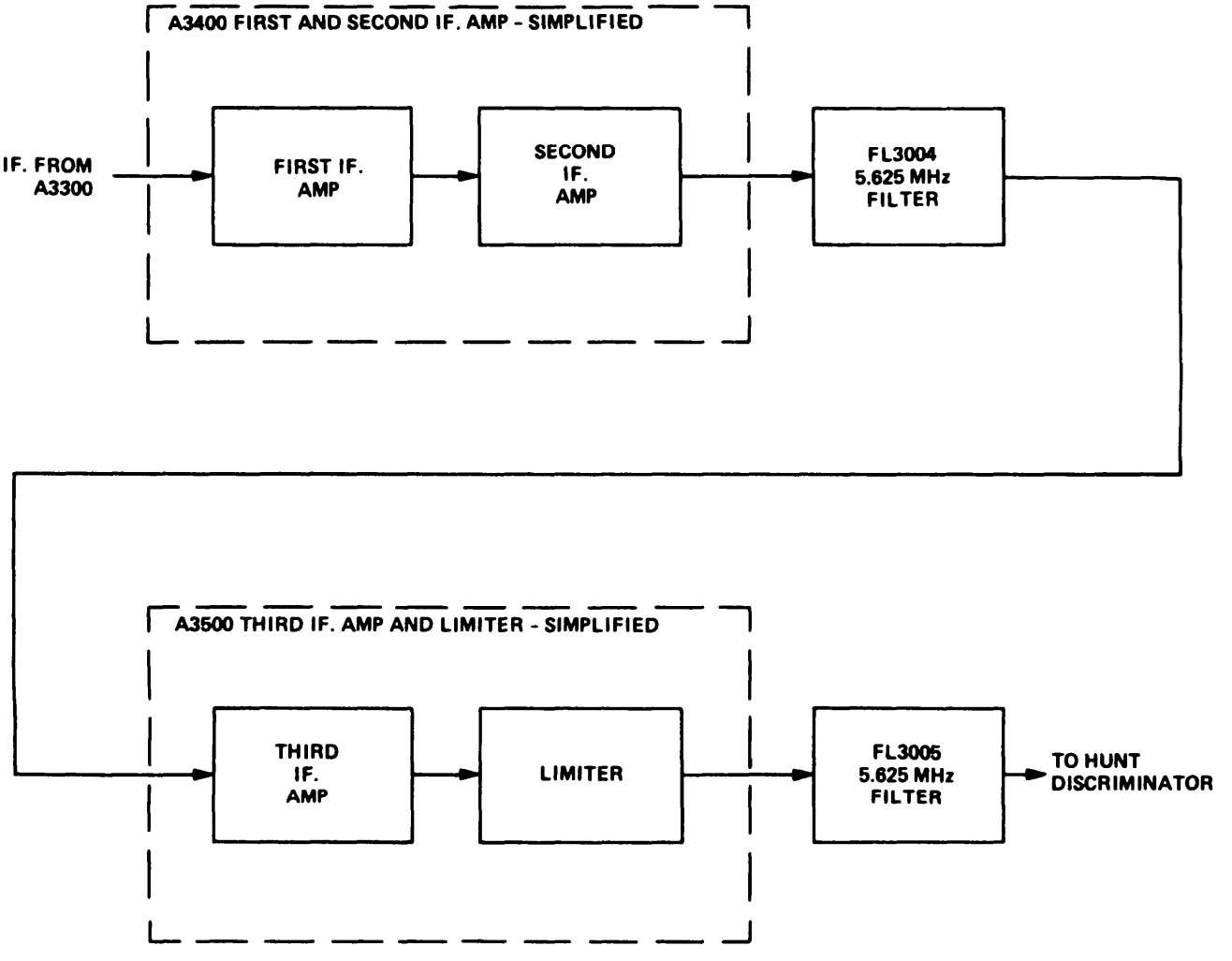
The two difference frequencies are produced as follows:

53.500	52.500
-46.850	-46.850
6.650	5.650

Of the two difference frequencies, 5.650 MHz is coupled across the tank to the next module. The other frequency, 6.650, is beyond the tank's bandwidth and, therefore, is attenuated.

The example presented assumes the local oscillator is running exactly at its correct frequency. In this case, exactly 5.65 MHz is passed by the second mixer's tank circuit. However, if the local oscillator is running above or below 41.5 MHz when the radio is tuned to 30.00 MHz, heterodyning occurring in mixer A3200 and in second mixer A3300 causes the second mixer to output a signal that differs from 5.65 MHz by the amount the local oscillator differs from 41.5 MHz. When the second mixer's output is not exactly 5.65 MHz, an error signal is generated to correct the local oscillator.

1-17. CRS FIRST AND SECOND IF. AMPLIFIER A3400/CRS THIRD IF. AMPLIFIER AND LIMITER A3500.


A3400 FIRST AND SECOND IF. AMP - SIMPLIFIED
IF. FROM A3300
FIRST IF. AMP
SECOND IF. AMP
FL3004 5.625 MHz FILTER
A3500 THIRD IF. AMP AND LIMITER - SIMPLIFIED
THIRD IF. AMP
LIMITER
FL3005 5.625 MHz FILTER
TO HUNT DISCRIMINATOR

EL1AT093

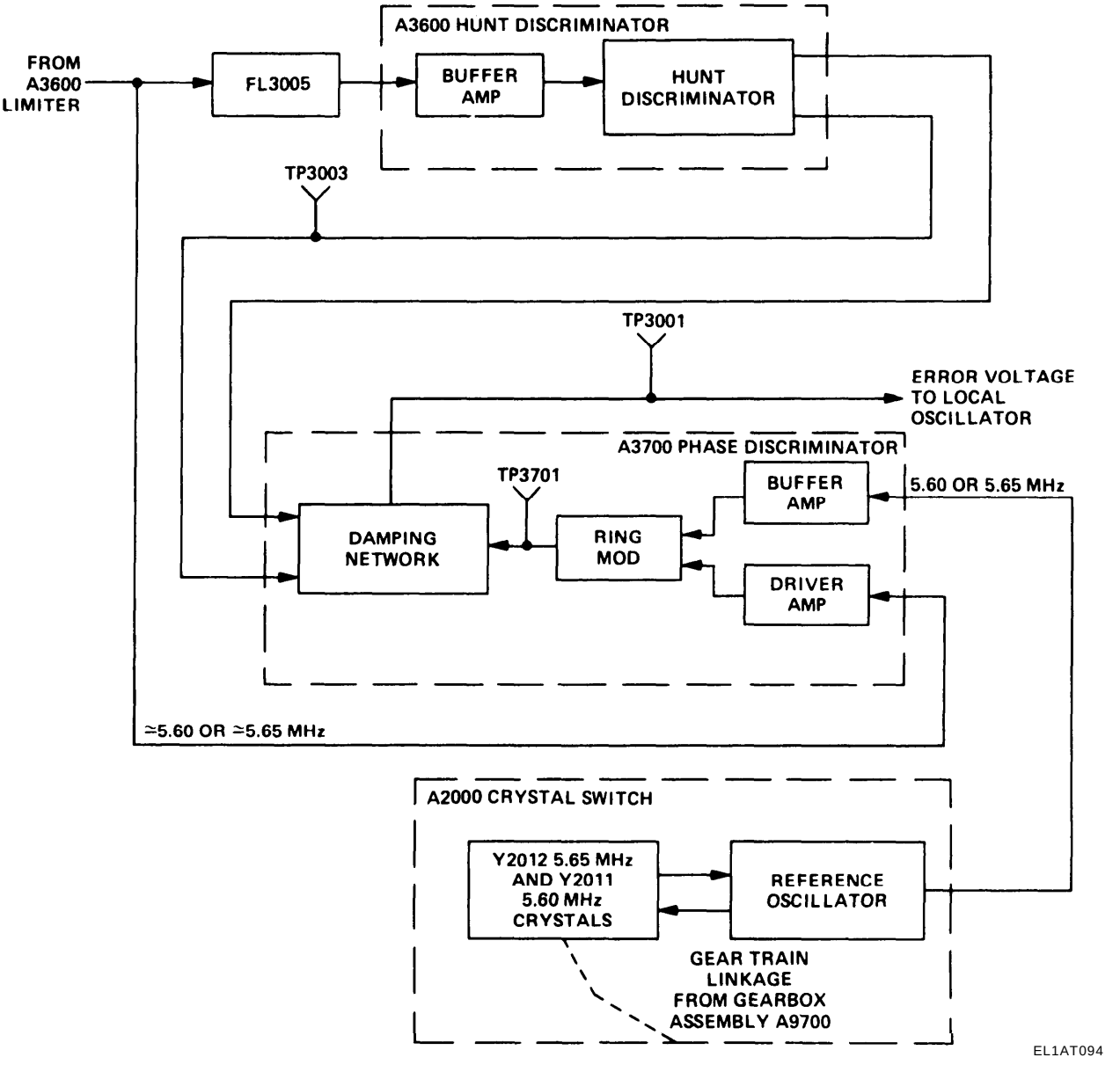
An intermediate frequency from the second mixer is applied to the first if. amplifier. The intermediate frequency is approximately 5.65 MHz for all front panel decimal control settings which are even, such as 30.00, 30.10, 30.20, etc. An if. of approximately 5.60 MHz is applied to the first if. amplifier for all odd decimal control settings, such as 30.05, 30.15, 30.25, etc. if. inputs are given as approximations because they vary in response to the local oscillator's frequency error.

Further amplification is provided by the second if. amplifier after which the signal is passed through filter FL3004. The filter's band pass is narrow and therefore causes attenuation of any frequencies other than the if. which might pass through first and second if. amplifier A3400.

1-17. CRS FIRST AND SECOND IF. AMPLIFIER A3400/CRS THIRD IF. AMPLIFIER AND LIMITER A3500. (CONT)

The third if. amplifier increases the signal strength sufficiently to drive the limiter. The limiter clips the upper and lower peaks of the if. to maintain a constant amplitude required by the travis-type discriminator in hunt discriminator A3600. Filter FL3005 provides additional attenuation of all signals other than the if. input.

1-18. CRS HUNT DISCRIMINATOR A3600, CRS PHASE DISCRIMINATOR A3700, AND REFERENCE OSCILLATOR A2000.



HUNT DISCRIMINATOR A3600

If. signals with a frequency of approximately 5.6 or 5.65 MHz are applied to buffer amplifier A3600, which prevents loading down the limiter. The buffer amplifier's output is then fed to the travis-type hunt discriminator.

1-18. CRS HUNT DISCRIMINATOR A3600, CRS PHASE DISCRIMINATOR A3700, AND REFERENCE OSCILLATOR A2000. (CONT)

The hunt discriminator is tuned to a 5.625 MHz center frequency. It will therefore generate output signals when its if. input is substantially under or over 5.625 MHz, which condition corresponds to a large local oscillator error.

The hunt discriminator generates two kinds of signals, one of which is applied to the local oscillator through the damping network to coarse tune the oscillator. When the local oscillator is far off frequency (eg, -250 kHz), as it could be when changing channels, the hunt discriminator outputs a negative dc voltage. This voltage can be measured at TP3003 with a dc voltmeter. When changing channels, the local oscillator could be off frequency by some positive number of cycles, in which case a positive voltage could be measured at TP3003. The plus or minus dc signal is applied to the local oscillator as an error voltage, which corrects the local oscillator's frequency. Therefore, the dc voltage at TP3003 is only momentary; that is, it disappears when the local oscillator approaches the correct frequency.

Besides the dc error voltage, the hunt discriminator outputs an ac signal riding on the dc level. This occurs because the local oscillator can drift around its steady state tuned frequency. The rate of drift produces an ac signal from the hunt discriminator at the oscillator's drift rate. However, this ac component is almost completely attenuated in the phase discriminator's damping network, and therefore has no effect on the local oscillator.

The hunt discriminator is capable of outputting an error signal as great as ± 2.6 vdc measured at TP3001 when a ground is applied to TP3701 (shorting the phase discriminator's output) and the local oscillator is running ± 350 kHz off frequency. Strong dc output from the hunt discriminator rapidly biases the local oscillator to within approximately 100 kHz of its correct frequency. Once the local oscillator is running ± 100 kHz from center frequency, the hunt discriminator is not sensitive enough to fine tune the oscillator further. At this point, the phase discriminator begins to take control.

CRS PHASE DISCRIMINATOR A3700

Phase discriminator A3700 contains a ring modulator similar to that found in transmitter phase discriminator A8200. It compares the phase of the signals from buffer and driver amplifiers A3700, and outputs a dc error voltage when a phase difference exists. An ac component will ride the dc level due to oscillator drift, but the ac component is attenuated in the damping network and, therefore, is not measurable at TP3001.

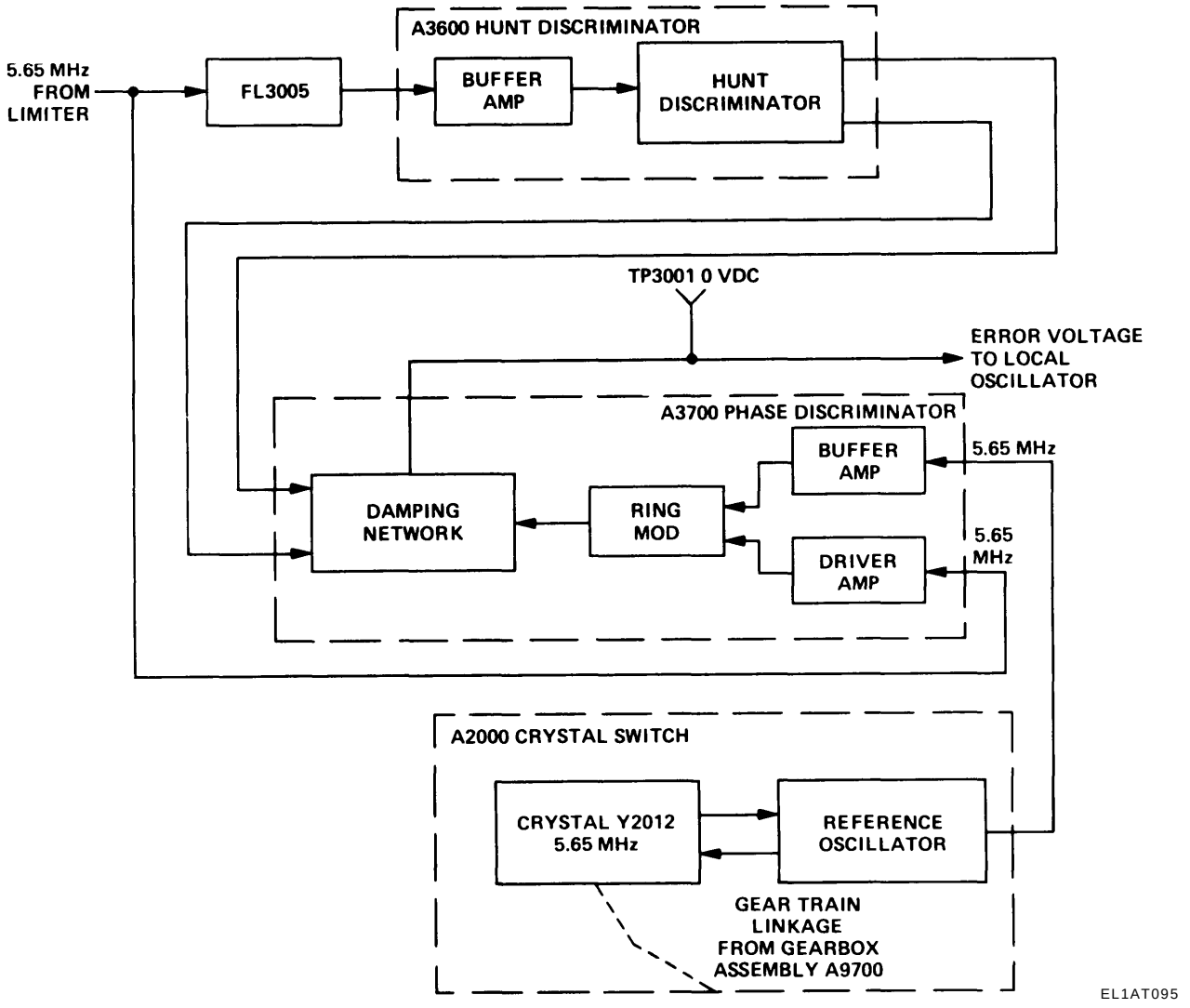
Once the hunt discriminator forces the local oscillator close to its correct frequency, the phase discriminator maintains a ±3.5 kHz oscillator tolerance. Because of its sensitivity to small errors in the oscillator frequency, the phase discriminator performs a fine tuning function.

REFERENCE OSCILLATOR A2000

The output of reference oscillator A2000 is controlled by one of two crystals: a 5.60 MHz crystal and another at 5.65 MHz. The crystals are selected by a switch through the action of the radio's gear train. The switch contains contacts that correspond to 20 possible 50 kHz increments that can be selected between whole-number frequencies. All frequencies whose decimal digits end in zero utilize the 5.65 MHz crystal. For example, the rotary switch selects 5.65 MHz crystal for 30.00, 30.10, 30.20, 30.30 MHz, etc. Decimal frequencies ending in five use 5.80 MHz crystal such as 30.05, 30.15, 30.25 MHz.

1-18. CRS HUNT DISCRIMINATOR A3600, CRS PHASE DISCRIMINATOR A3700, AND REFERENCE OSCILLATOR A2000. (CONT)

HUNT DISCRIMINATOR, PHASE DISCRIMINATOR; REFERENCE OSCILLATOR – WORKING EXAMPLE – LOCAL OSCILLATOR AT CORRECT FREQUENCY



If the radio is set to 30.00 MHz, the local oscillator runs at 41.50 MHz, assuming that it is properly alined. In this case, the limiter output is 5.65 MHz.

When 5.65 MHz is applied to the hunt discriminator through the buffer amplifier, no dc signal is fed from the hunt discriminator to the damping network. Therefore, no dc voltage will be present at TP3001 due to hunt discriminator action.

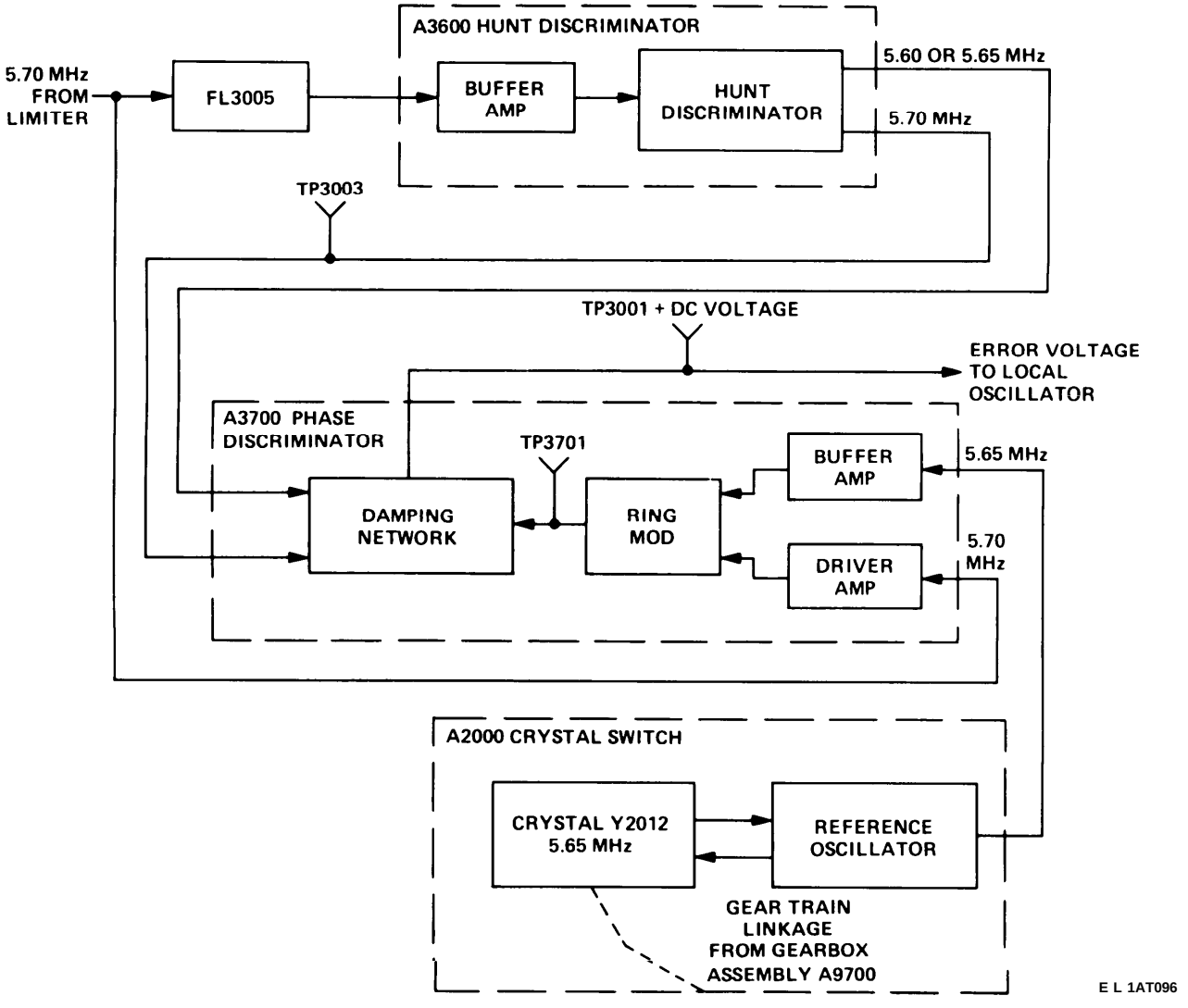
The same 5.65 MHz signal applied to the hunt discriminator is fed to the driver amplifier in the phase discriminator module. This frequency is compared with the output of the reference oscillator which is applied to buffer amplifier A3700.

1-18. CRS HUNT DISCRIMINATOR A3600, CRS PHASE DISCRIMINATOR A3700, AND REFERENCE OSCILLATOR A2000. (CONT)

With the radio set to 30.00 MHz, the 5.65 MHz crystal is selected, causing the reference oscillator to output a 5.65 MHz fixed frequency. Since the reference oscillator and limiter output frequencies are the same, the phase discriminator does not output a dc voltage to the damping network. Therefore, no dc voltage will be present at TP3001 due to the phase discriminator action.

In actual operation even with the local oscillator almost perfectly alined, a slight plus or minus dc voltage is present at TP3001. Its presence is due to normal imbalances in the hunt discriminator and phase discriminator circuits.

HUNT DISCRIMINATOR, PHASE DISCRIMINATOR; REFERENCE OSCILLATOR-WORKING EXAMPLE – LOCAL OSCILLATOR RUNNING TOO HIGH

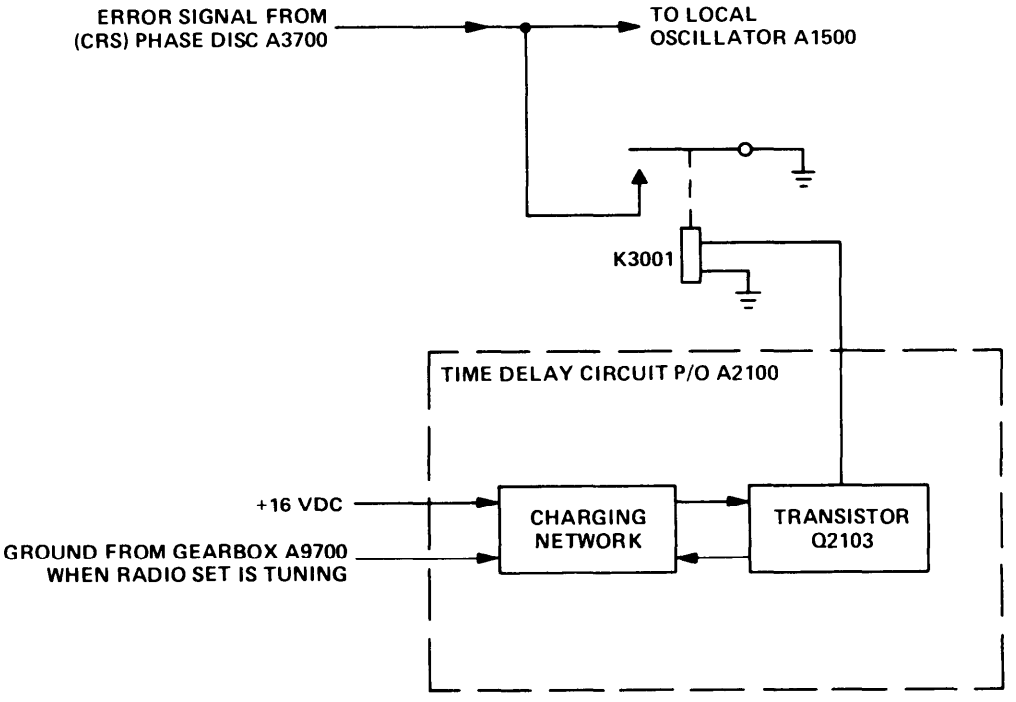


Assume the radio is set to 30.00 MHz and the local oscillator is misalined, thereby causing it to operate at 41.550 MHz. The output of the limiter, 5.70 MHz, is 50 kHz higher than it would be if the oscillator were exactly on frequency.

1-18. CRS HUNT DISCRIMINATOR A3600, CRS PHASE DISCRIMINATOR A3700, AND REFERENCE OSCILLATOR A2000. (CONT)

The two signals entering the phase discriminator are 5.65 MHz from the reference oscillator and 5.70 MHz from limiter A3500. Because of the difference in frequencies, the phase discriminator outputs a dc voltage. This positive dc voltage is measurable at TP3001.

1-19. TIME DELAY CIRCUIT P/O MODULE A2100.


ERROR SIGNAL FROM (CRS) PHASE DISC A3700
TO LOCAL OSCILLATOR A1500
K3001
TIME DELAY CIRCUIT P/O A2100
+16 VDC
GROUND FROM GEARBOX A9700 WHEN RADIO SET IS TUNING
CHARGING NETWORK
TRANSISTOR Q2103

EL1AT124

Voltage regulator assembly A2100 contains the time delay circuit which operates relay K3001 in the crs when the 16 vdc supply is turned on. As power is applied, current flows through Q2103 and the coil of relay K3001. Relay K3001 energizes, sending the error signal from the crs phase discriminator to ground, while Q2103 charges the charging network. When the charging network is fully charged, Q2103 is biased off, deenergizing K3001, which then allows the error signal from the phase discriminator to correct the frequency of the local oscillator.

When the radio set is tuning, by rotating the tuning dials, gearbox assembly A9700 supplies a ground signal to the charging network. The ground signal discharges the network and causes relay K3001 to energize. When K3001 is energized, the error signal from the phase discriminator flows to ground, allowing the local oscillator to change frequency.

If power is removed momentarily and then reapplied, components in the charging network will allow the time delay circuit to operate.

1-20. GEARBOX ASSEMBLY A9700.

Refer to FO-3 in the back of this manual while reading the text in this paragraph.

The electrical portion of gearbox assembly A9700 contains a standard Iedex stepping solenoid having 20 positions of 18 degrees rotation per step, a 24-position switch driven by a dc motor, and a dc motor to control band switching.

The Iedex drive is used to select the last two digits of the frequency selected and positions S2001 in rf oscillator assembly A2000 which contains reference oscillator Q2001 and interpolation oscillator Q2002. The 24-position switch (S9705) is driven by dc motor B9703 and provides an accurate mechanical output to the vhf tuner, oscillator buffer, and rf amplifier assemblies.

The gearbox assembly automatically tunes the radio set to the frequency selected at the control unit. The tuning control signals are applied to 0.05 MHz select lines in various combinations according to the frequency selected. Assuming the operating frequency chosen is 30.00 MHz, ground signals are applied to control lines A and E of both 0.05 MHz select and MHz select circuits.

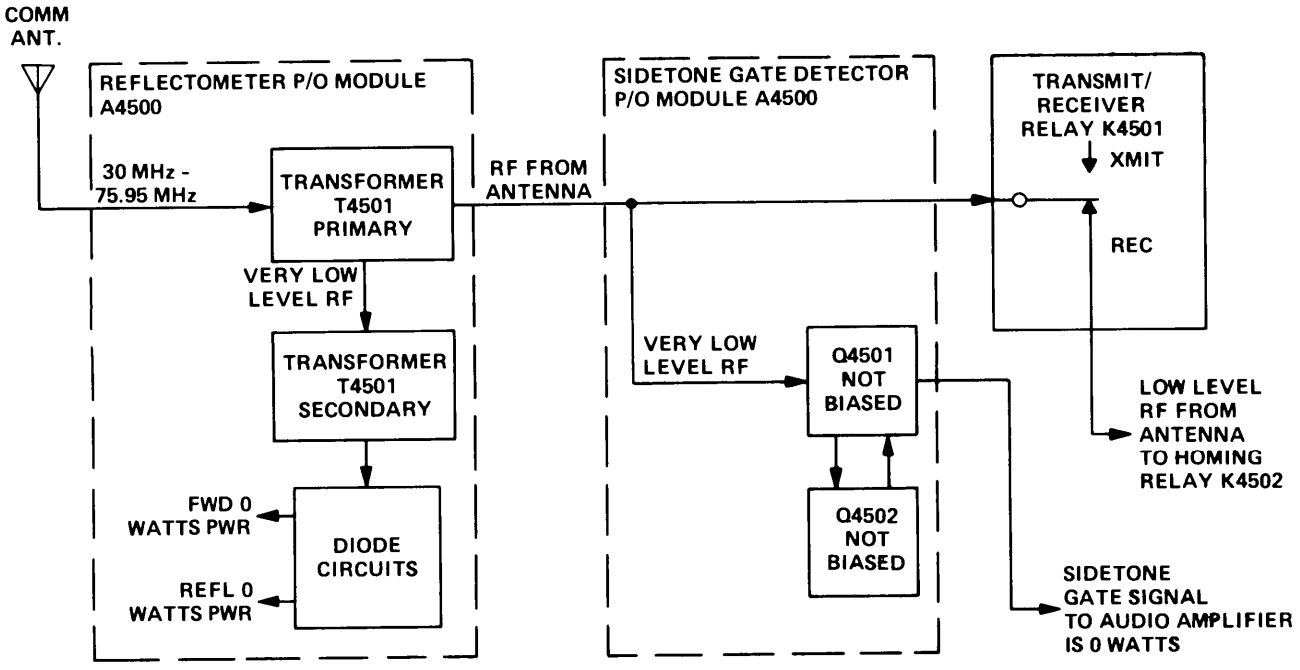
The ground signals are applied to one side of both code comparators and are connected to contacts 3 and 7 of Iedex switch S9703 and contacts 5 and 6 of switch S9705.

The network consisting of diodes CR9702 through CR9706 and transistors Q9701 and Q9702 detects mispositioning of switch S9703 for any frequency selected at the control unit. Mispositioning is defined as that position of the switch rotor which causes either a short or an open condition to exist at both ends of a particular control line. In normal operation, when a ground signal is applied to one end of the control unit, the other end should be open at the switch rotor in the gearbox assembly. Those control lines not grounded at the control unit should be shorted at the switch rotor in the gearbox.

The network of diodes CR9714 through CR9718 with transistors Q9703 and Q9704 perform the same function for switch S9705. For discussion purposes, only the circuit of switch S9705 will be considered since the operation of switch S9703 and associated diode transistor network are identical. After tuning to the desired operating frequency, in this case 30.00 MHz, switches S9703 and S9705 are positioned as shown in FO-3. This action causes the base and emitter of transistor Q9703 to be connected together through the rotor of S9705, causing Q9703 to be turned off.

When the radio set is tuning, the ground signal applied to emitters of Q9701 through Q9704 is sensed by diodes CR9711 and CR9723 and is applied through pin 14 of connector J9701 to the control coil of relay K9605 (not shown) in the receiver-transmitter. Relay K9605 energizes and applies + 16 vdc to the 800 Hz relaxation oscillator in receiver-audio amplifier assembly A5400. The 800 Hz tone is applied to the audio output line and operator's headset during the tuning process.

1-21. RF CONTROL ASSEMBLY P/O MODULE A4500 (RECEIVE MODE).



EL1AT097

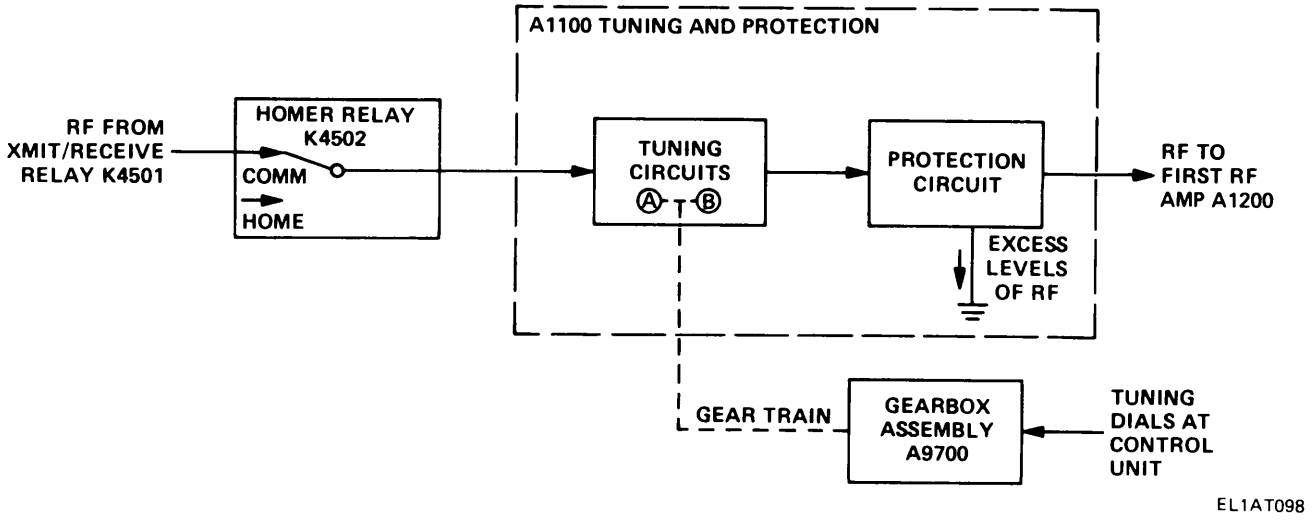
Frequency modulated rf from the communications antenna is applied through the primary of transformer T4501 to the sidetone gate detector. Very low levels of rf are coupled-to the secondary of transformer T4501 and then applied to the diode circuits. The diode circuits will not produce-an output unless the rf level is 0.6 watt or greater. In receive mode, the rf level entering the diode circuits is well below 0.6 watt; therefore, the reflectometer will not operate.

Low level rf entering the sidetone gate detector from the primary of transformer T4501 is applied to both transmit/receive relay K4501 and transistor Q4501. In receive mode, rf modulated signals entering relay K4501 are applied to homing relay K4502 and then to antenna tuning and protection circuits module A1100.

Rf signals applied to transistors Q4501 and Q4502 must be 0.6 watt or greater to bias the transistors. In receive mode, the rf signal is well below 0.6 watt, therefore, both Q4501 and Q4502 are not biased. When Q4501 and Q4502 are not biased, the sidetone gate detector will not operate and no sidetone gate signal is generated.

The reflectometer and sidetone gate detector will operate in transmit mode and are discussed in paragraph 1-49.

1-22. ANTENNA TUNING AND PROTECTION MODULE A1100.

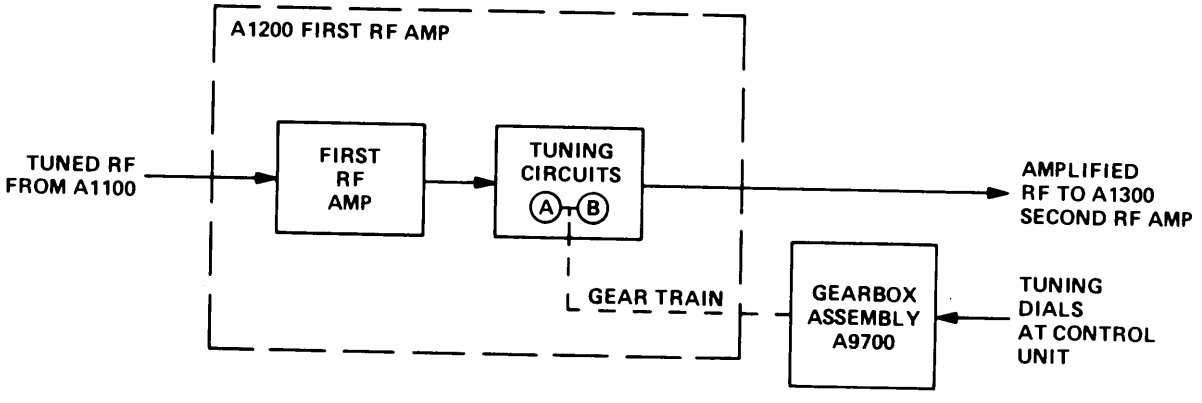


Frequency modulated rf signals from transmit/receive relay K4501 are fed through homer relay K4502 to the A1100 tuning circuits which consist of tuned tank circuits. The tuning circuits consist of an (A) band, 30 MHz through 52.95 MHz, and a (B) band, 53 MHz through 75.95 MHz. The gear train selects band (A) or (B), depending on the setting of tuning dials at the control unit. The resonant frequencies of the tank circuits are varied by rotating the tuning dials, which alter the inductance and change the overall LC ratio in the (A) and (B) frequency range.

The bandwidths of the resonant tank circuits allow passage of signals of the selected frequency while unwanted frequencies are rejected.

The protection circuit has a neon lamp which shunts excess rf signal strength to ground. From the protection circuit, rf signals are applied to tuning circuits in the first rf amplifier.

1-23. FIRST RF AMPLIFIER MODULE A1200.

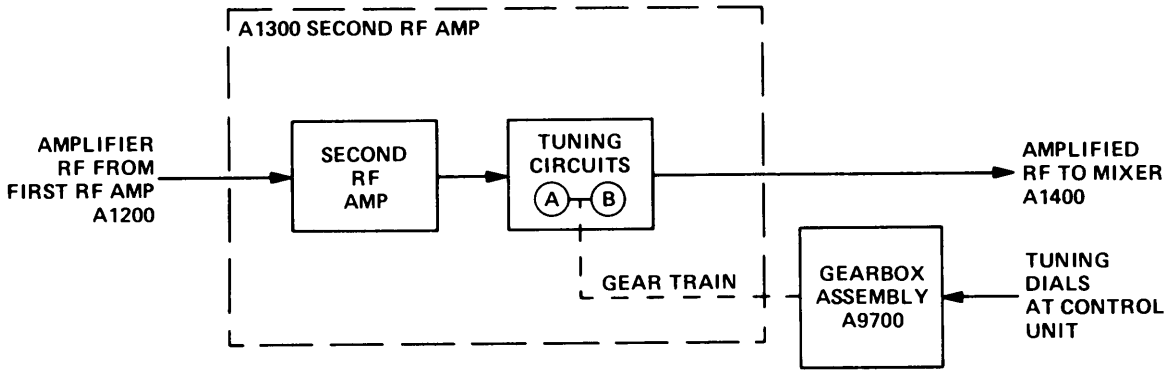


Rf signals are amplified by the first rf amplifier, which consists of vacuum tube V1201. The amplified signals are then fed to tuning circuits which function similarly to those described in the previous paragraph.

1-23. FIRST RF AMPLIFIER MODULE A1200. (CONT)

The A1200 tuning circuits provide additional attenuation of unwanted frequencies by the action of their narrow band pass resonant tanks.

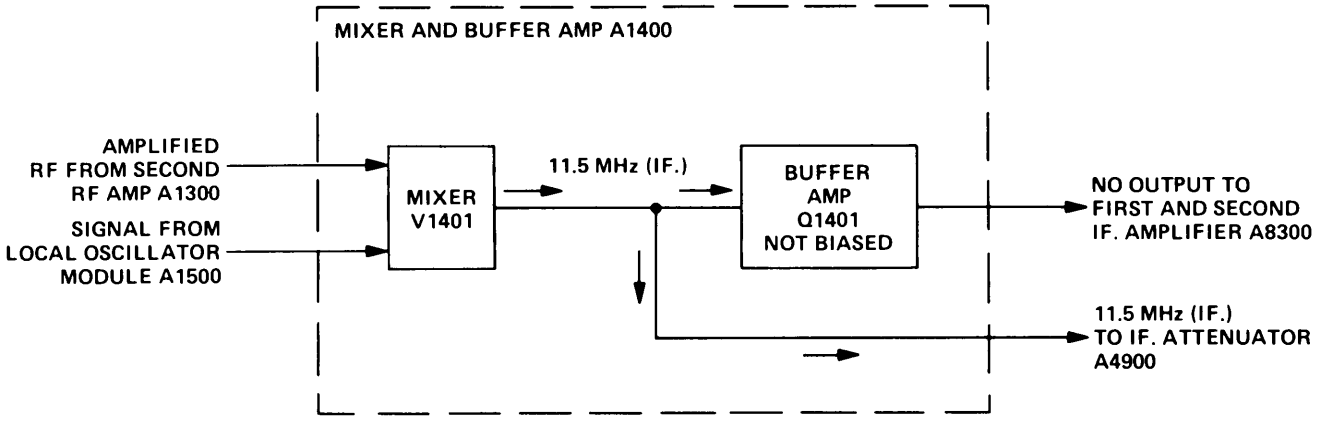
1-24. SECOND RF AMPLIFIER MODULE A1300.



EL1AT100

Signals from the first rf amplifier are further amplified by the second rf amplifier which contains vacuum tube V1301. The tuning circuits function similarly to those in module A1200.

1-25. MIXER AND BUFFER AMPLIFIER A1400 (RECEIVE MODE).


MIXER AND BUFFER AMP A1400
AMPLIFIED RF FROM SECOND RF AMP A1300
SIGNAL FROM LOCAL OSCILLATOR MODULE A1500
MIXER V1401
11.5 MHz (IF.)
BUFFER AMP Q1401 NOT BIASED
NO OUTPUT TO FIRST AND SECOND IF. AMPLIFIER A8300
11.5 MHz (IF.) TO IF. ATTENUATOR A4900

EL1AT101

1-15. MIXER AND BUFFER AMPLIFIER A1400 (RECEIVE MODE). (CONT)

Mixer V1401 is the last of three vacuum tubes in the receiver section. During the receive operation it accepts the following inputs:

Amplified frequency-modulated rf from module A1300
A frequency from the local oscillator which is, in the Ⓐ band, 11.5 MHz above or in Ⓑ band 11.5 MHz below the frequency of module A1300.

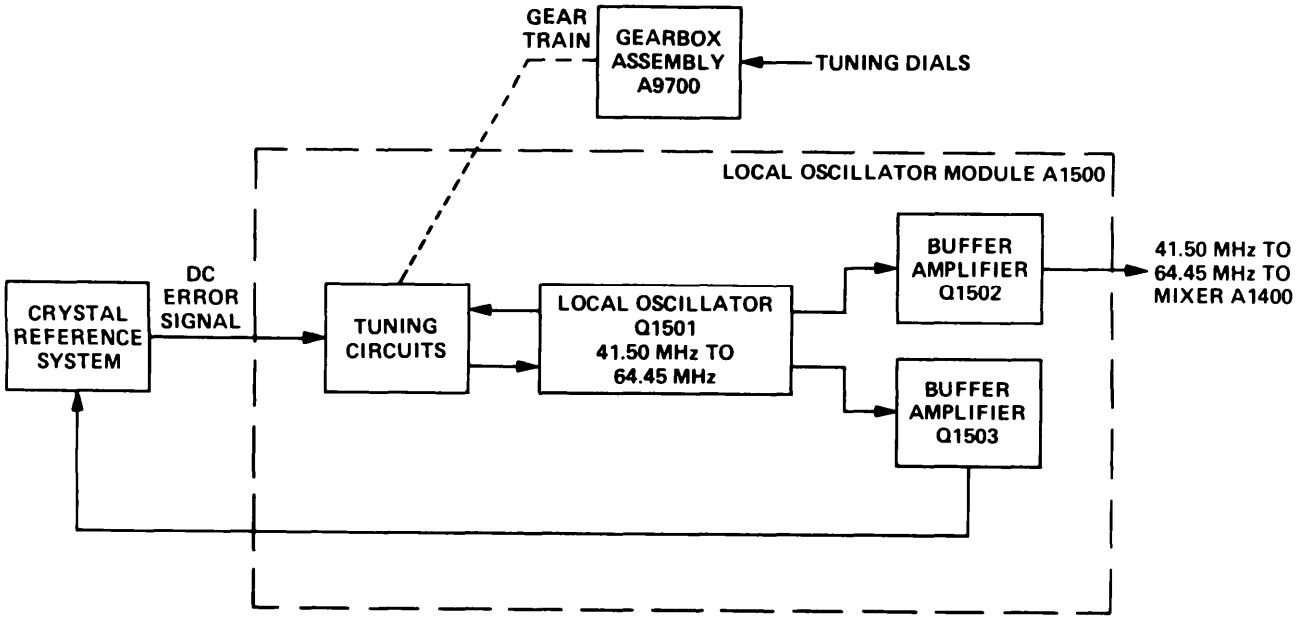
The two signals applied to the mixer are heterodyned (mixed) to produce an if. which carries audio intelligence. The 11.5 MHz if. output from the mixer is applied to the following:

If. Attenuator Module A4900
Buffer Amp Q1401

Buffer amp Q1401 does not operate in the receive mode; therefore, no signal is present at its output. In the receive mode, transistor Q1401 cannot conduct because there is no dc voltage to bias it. In the transmit mode of operation only, 16 vdc biases buffer amp Q1401.

For a discussion of the mixer and buffer amplifier operating in transmit mode, see paragraph 1-43.

1-26. LOCAL OSCILLATOR MODULE A1500.



EL1AT102

1-26. LOCAL OSCILLATOR MODULE A1500. (CONT)

TUNING CIRCUITS

The tuning circuits control the frequency of the oscillator. They contain resonant tank circuits with a mechanical linkage from a variable inductor to the gear train which enables the radio set to tune to the frequency set by the control unit automatically.

A dc error signal from the crs is applied to a varactor (variable capacitance diode) in the tuning circuits to alter the tank capacitance, thereby changing the resonant frequency and operating frequency of the oscillator. The dc error voltage from the crs keeps the oscillator running to within ± 3.5 kHz of the frequency selected on the tuning dials.

LOCAL OSCILLATOR Q1501

Q1501 is a pnp transistor designed into a modified colpitts configuration. Frequency tuning by the tuning circuits enables the oscillator to operate within a range of 41.50 MHz through 64.45 MHz. The oscillator applies the frequency to mixer module A1400.

For all frequency settings on the control unit in (A) band range, the local oscillator o crates 11.5 MHz above the selected frequency. For all frequency settings on the control unit in B band range, the local oscillator operates 11.5 MHz below the selected frequency. For some examples, see the following table.

CHANNEL SELECTED BY TUNING DIALS SELECTED FREQUENCY	BAND (A) 30-52.95 MHz	RANGE (B) 53-75.95 MHz	LOCAL OSC. OUTPUT TO MIXER
30.00 MHz			41.50 MHz
40.55 MHz			52.05 MHz
52.95 MHz			64.45 MHz
53.00 MHz			41.50 MHz
65.00 MHz			53.50 MHz
75.95 MHz			64.45 MHz

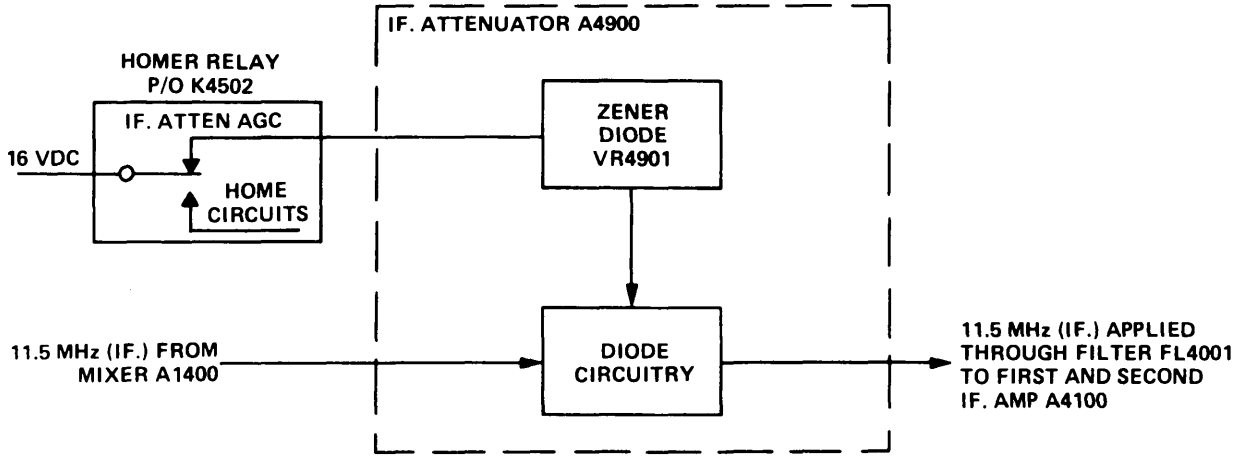
BUFFER AMPLIFIER Q1502

Buffer amplifier Q1502 provides amplification, isolation, and impedance matching for the local oscillator signal being applied to mixer V1401.

BUFFER AMPLIFIER Q1503

Buffer amplifier Q1503 provides amplification, isolation, and impedance matching for the Iocal oscillator signal being applied to the crs. The Iocal oscillator applies a signal to the crs through buffer amp Q1503 for the purpose of having a dc error voltage applied back to the local oscillator.

1-27. IF. ATTENUATOR MODULE A4900 (RECEIVE MODE).



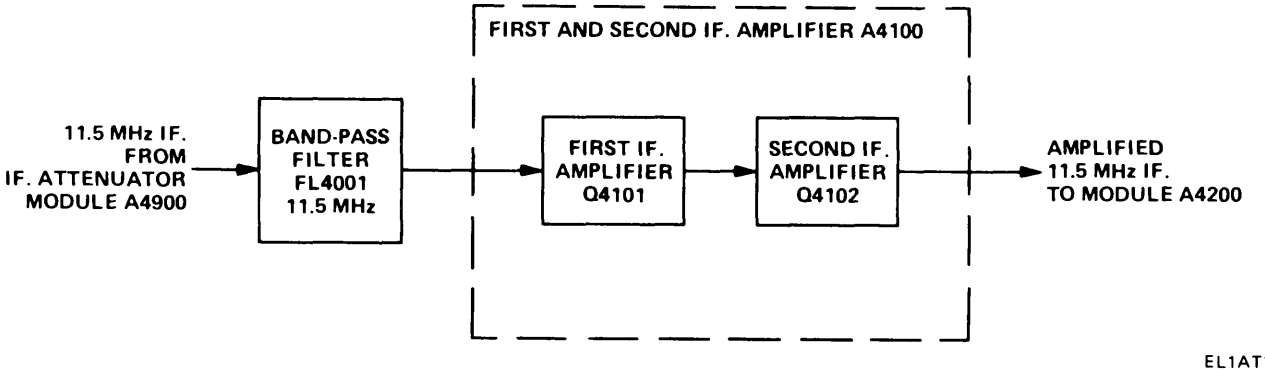
EL1AT103

In receive mode, if. attenuator module A4900 allows if. signals from the mixer to pass through the diode circuitry with minimum attenuation.

Constant 16 vdc from homer relay K4502 is applied to a zener diode in the if. attenuator module. This causes the zener diode to apply an increased level of voltage to the diode circuitry, fully biasing the diodes. When the diodes in the diode circuitry are fully biased, a direct unattenuated path is available for the if. from the mixer to flow to first and second if. amplifier module A4100.

The if. attenuator functions in transmit mode exactly as it does in receive mode. For a discussion of the if. attenuator operation in homing mode, see paragraph 1-52.

1-28. FIRST AND SECOND IF AMPLIFIER A4100.



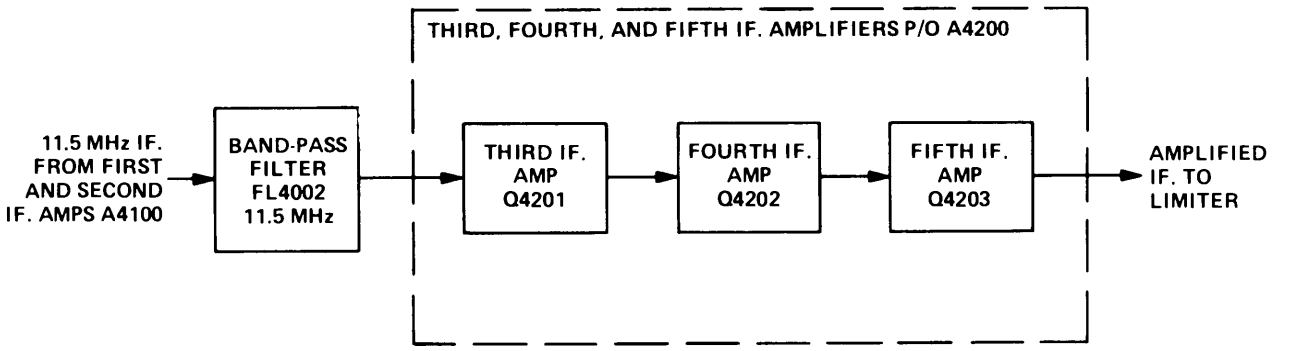
EL1AT104

The 11.5 MHz if. carrying audio intelligence from the if. attenuator is applied through band-pass filter FL4001 to Q4101, which performs the first stage of amplification. Second if. amp Q4102 provides a second stage of amplification.

Amplified 11.5 MHz if. from the second if. amplifier is applied through filter FL4002 to module A4200.

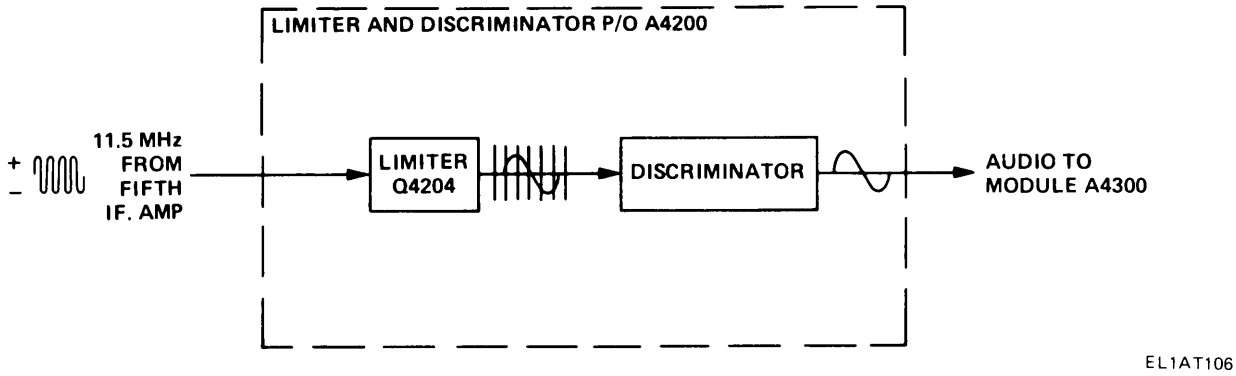
1-29. THIRD, FOURTH, AND FIFTH IF. AMPLIFIER, LIMITER AND DISCRIMINATOR A4200.

THIRD, FOURTH, AND FIFTH IF. AMPLIFIERS


THIRD, FOURTH, AND FIFTH IF. AMPLIFIERS P/O A4200
11.5 MHz IF. FROM FIRST AND SECOND IF. AMPS A4100
BAND-PASS FILTER FL4002 11.5 MHz
THIRD IF. AMP Q4201
FOURTH IF. AMP Q4202
FIFTH IF. AMP Q4203
AMPLIFIED IF. TO LIMITER
EL1AT105

The third, fourth, and fifth if. amplifiers provide additional gain necessary to drive the limiter.

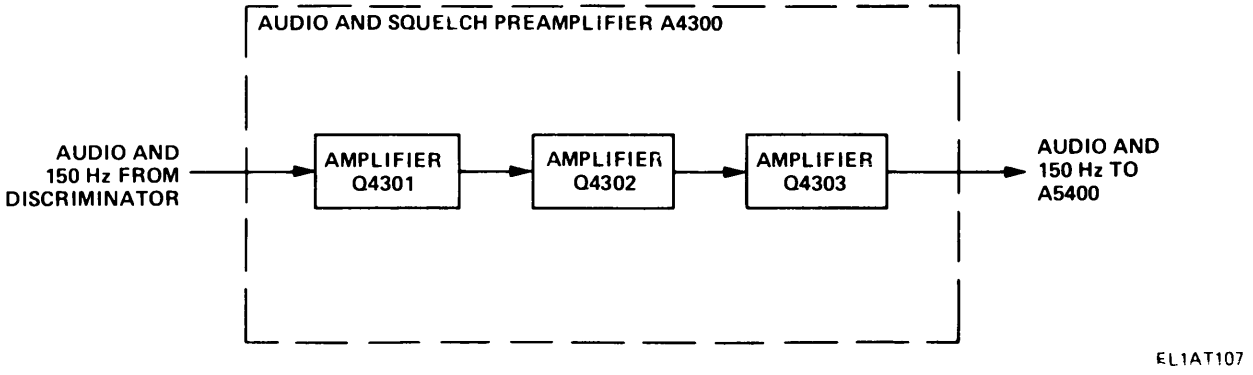
LIMITER AND DISCRIMINATOR



The limiter receives if. from the fifth if. amplifier. The positive and negative peaks of the if. waveform are clipped by the limiter to provide a constant amplitude signal to the discriminator.

The discriminator is a travis-type containing tuned resonant tanks. When properly alined, the output is the modulating intelligence with no dc offset. Any residual if. is shunted to ground by an rf trap. Audio intelligence from the discriminator is applied to audio and squelch preamplifier module A4300.

1-30. AUDIO AND SQUELCH PREAMPLIFIER MODULE A4300.



The discriminator in module A4200 demodulates both the audio intelligence and the 150 Hz squelch tone signal. The 150 Hz squelch tone signal will be present in the receiver circuits only if the operator of a nearby transmitter is transmitting rf. Audio and squelch preamplifier A4300 subjects both these frequencies to preliminary stages of amplification, then applies the signal(s) to audio amp A5400.

1-31. AUDIO AMPLIFIER MODULE A5400 (RECEIVE MODE).

To follow the signal path through audio amplifier module A5400, see FO-4 while reading the text in this paragraph.

The audio signal and 150 Hz tone signal from the audio and squelch preamplifier are applied to amplifier Q5401 (1) in audio amplifier module A5400. See the following table.

NEARBY TRANSMIlTER SQUELCH SWITCH SET TO	SIGNALS APPLIED TO AUDIO AMP
TONE	audio intelligence and 150 Hz
CARR	audio intelligence and noise components
DIS (disable)	audio intelligence and noise

The amplified output from Q5401 (1) is applied through:

B3 and B2 of relay K5501
Low-pass filter FL5501 (2)

Signals flowing through B3 and B2 of relay K5501 will be used to unsquelch the audio amplifier. The same signals are also applied to low-pass filter FL5501 (2) in order to filter out noise above 3000 Hz. The audio intelligence is applied from the filter through potentiometer R5405 (3) to amplifier Q5403 (4) for amplification. Potentiometer R5405 provides adjustment of the standard audio output level of 2.8 volts.

1-31. AUDIO AMPLIFIER MODULE A5400 (RECEIVE MODE). (CONT)

The 150 Hz signal from output of amplifier Q5401 (1) operates relay K5501, which in turn, operates A2 and A1 of relay K5502, sending + 16 vdc to amplifier Q5403 (4). The 16 vdc from relay K5502 biases amplifiers Q5403 (4), Q5404 (5), and Q5405 (6), which will allow amplified audio intelligence to flow to transformer T5401 (7).

Amplified audio signals are coupled from transformer T5401 to the interphone amplifier to be heard in the headset.

800 HZ TONE OSCILLATOR Q5402

The audio amplifier provides an 800 Hz tone signal heard in the headset when the radio set is tuning. Selection of an operating frequency at the control unit causes the radio set to tune, which, in turn, causes gearbox assembly A9700 (8) to supply a ground signal to relay K9605 (9). When relay K9605 energizes, + 16 vdc is applied to 800 Hz tone oscillator Q5402 (10) and the audio amplifier. This causes the audio amp to unsquelch (bias the amplifiers) and allows the oscillator to oscillate.

The output of the 800 Hz oscillator is applied to amplifier Q5403 (4). The signal then flows through Q5404 (5), Q5405 (6), and transformer T5401 (7) to be heard in the headset.

1-32. RECEIVER SQUELCH AMPLIFIER MODULE A5200 AND SQUELCH FILTER MODULE A5300 (RECEIVE MODE).

To follow the signal path through the squelch amplifier and filter, see FO-4 while reading the text in this paragraph.

The receiver-squelch amplifier passes or blocks the output audio signal of the audio amplifier by allowing or not allowing + 16 vdc to enter the audio amplifiers. See the following table.

+16VDC FROM RELAY K5502	Q5403 (4), Q5404 (5) Q5405 (6), BIASED ON OR OFF	RECEIVER SQUELCHED OR UNSQUELCHED	AUDIO HEARD OR NOT HEARD IN HEADSET
ENTERS AUDIO AMP A5400	ON	UNSQUELCHED	HEARD
DOES NOT ENTER AUDIO AMP	OFF	SQUELCHED	NOT HEARD

Receiver-squelch amplifier A5200 controls the application of +16 vdc to audio amp A5400 in either one of two modes: TONE OR CARR. When the squelch switch is set to DIS, the squelch amplifier is bypassed and +16 vdc is applied to the audio amp for the duration of the DIS mode setting.

1-32. RECEIVER SQUELCH AMPLIFIER MODULE A5200 AND SQUELCH FILTER MODULE A5300 (RECEIVE MODE). (CONT)

TONE (SQUELCH MODE)

The received 150 Hz signal at the output of amplifier Q5401 (1) in the audio amplifier is applied through B3 and B2 of relay K5501 to amplifier Q5201 (11) in the squelch amplifier. The signal is amplified and applied to amplifiers Q5203 (12) and Q5204 (13) for further amplification.

The 150 Hz signal at the output of amplifier Q5204 is applied through B2 and B1 of tone mode relay K5503 to tone frequency adjust and capacitor coupling (14) in squelch filter module A5300. In the TONE mode of squelch operation, the signal is applied through parallel twin T-circuit (15), which attenuates the 150 Hz tone. Potentiometer R5301 (14) is adjusted to provide maximum attenuation of the 150 Hz squelch tone signal. All other frequencies are fed back to amplifier Q5202 (16), which completes the feedback loop. The ac amplifiers are completely degenerative for all frequencies except 150 Hz, and provide maximum gain at 150 Hz.

The 150 Hz signal at maximum gain from Q5204 (13) and from squelch filter (15) is applied to tone rectifier CR5202 (17) for rectification. The rectified signal from CR5202 causes the current in Q5206 (18) to increase. Increased current flowing through B2 and B1 of energized relay K5505 is amplified in amplifier Q5207 (19).

The output of amplifier Q5207 is applied through A3 and A2 of relay K5501, which energizes relay K5502. Energizing K5502 causes A1 and A2 to make contact, sending +16 vdc to the audio amplifier to cause unsquelching.

CARR (SQUELCH MODE)

In carrier squelch mode, audio signals and noise components at the output of Q5401 (1) in the audio amplifier are applied through B3 and B2 of relay K5501 to ac amplifier Q5201 (11) in squelch amplifier. Q5201 (11), Q5203 (12), and Q5204 (13) provide amplification of the signals. Once amplified, the signals are applied from Q5204 through B2 and B3 of deenergized relay K5503 to squelch filter (14). In the CARR mode of squelch operation, the signal is applied through the twin T-circuit (20) which attenuates noise components centered around 7300 Hz. Potentiometer R5301 (14) is adjusted to provide maximum attenuation of 7300 Hz signals. All other frequencies are fed back to amplifier Q5202 (16) which completes the feedback loop. The ac amplifiers are completely degenerative for all frequencies except 7300 Hz, and provide maximum gain at 7300 Hz.

The 7300 Hz noise component at maximum gain and an audio signal enter carrier rectifier CR5201 (21) from amplifier Q5204 (13) and squelch filter (20). When an audio signal is present, the carrier rectifier rectifies the noise component which causes current in Q5205 (22) to reduce. The reduced current level through B3 and B2 of deenergized relay K5505 causes amplifier Q5207 (19) to conduct.

The output of amplifier Q5207 (19) is applied through A3 and A2 of relay K5501, which energizes relay K5502. Energizing K5502 causes A1 and A2 to make contact, sending +16 vdc to the audio amplifier causing unsquelching.

When an audio signal is not present, receiver noise alone is present in the receiver. The rectified noise from carrier rectifier CR5201 (21) causes the voltage in Q5205 (22) to increase. Increased voltage is applied through B3 and B2 of deenergized relay K5505 to amplifier Q5207 (19) which causes it to turn off. When Q5207 is turned off, relay K5502 does not become energized and + 16 vdc does not enter the audio amplifier, causing squelching.

1-32. RECEIVER SQUELCH AMPLIFIER MODULE A5200 AND SQUELCH FILTER MODULE A5300 (RECEIVE MODE). (CONT)

DIS (SQUELCH MODE)

When the squelch switch is set to DIS position, receiver squelch amplifier A5200 is bypassed since a squelch disable ground signal is applied through A3 and A2 of relay K5501 to relay K5502. A ground signal at K5502 causes + 16 vdc to flow through A1 and A2 to audio amplifier A5400 causing unsquelching.

For a discussion of the squelch amplifier module A5200 and squelch filter operating in transmit mode, see paragraph 1-46.

1-33. TRANSMITTER SIGNAL FLOW.

A system block diagram showing transmitter signal flow can be found on FO-5 in the back of this manual. See the foldout while reading the text in this paragraph.

Voice signals from microphone (1) are applied through interphone amplifier (2) and control unit (3) to K9606 dummy relay (4). Squelch amplifier A5200 (29) and squelch filter A5300 (30) generate a 150 Hz tone signal which is applied through K9606 to audio mixer A8600 (5). The 150 Hz tone signal is always generated when the radio is in the transmit mode. The audio signal from K9606 is filtered in 3 kHz low-pass filter FL8701 and combined with the 150 Hz tone signal in audio mixer A8600 (5).

The combined 150 Hz tone and audio signal is used to frequency modulate transmitter 11.5 MHz modulator A8100 (6). The output of the transmitter 11.5 MHz modulator is fed to transmitter phase discriminator A8200 (7) which also receives the 11.5 MHz if. signal from mixer A1400 (19) through transmitter first and second if. amplifiers A8300 (20).

Transmitter phase discriminator A8200 compares the two incoming signals and outputs an audio signal and a dc correction voltage. The audio signal is coupled through transmitter hunt generator A8400 (8) to frequency modulate the frequency of master oscillator A6300 (9). The frequency of the master oscillator is determined by setting the tuning dials at the control unit.

The dc correction voltage from the phase discriminator is applied through the hunt generator to the master oscillator. If the master oscillator changes frequency (drifts), a dc correction voltage will bring the frequency to that of the frequency settings on the tuning dials. The dc correction voltage acts as a fine tuning control for the master oscillator.

When the master oscillator frequency is beyond the correcting range of the phase discriminator, transmitter hunt generator (8) will apply a signal to the oscillator and reduce the change in frequency to within the correcting range of the phase discriminator. The hunt generator acts as a coarse tuning control for the master oscillator. The audio modulated output of master oscillator A6300 is amplified by buffer amplifier A6400 (10) and applied to rf drivers A6500 (11). The buffer amplifier isolates the master oscillator from loading effects of the rf drivers. For a detailed discussion of the master oscillator frequency control, see paragraph 1-34.

1-33. TRANSMIITER SIGNAL FLOW. (CONT)

Buffer amplifier A6400 also applies audio modulated signals to isolation amplifier A6600 (18) and then to mixer A1400 (19). The isolation amplifier assures that buffer amplifier (10) output signals are injected into the mixer, but local oscillator signals are not injected back into the buffer amplifier to cause spurious outputs.

Master oscillator signals originating in A6300 (9) are combined in mixer A1400 (19) with those originating in local oscillator A1500 (22) which is kept at correct frequency by crs (21). The mixing process produces an 11.5 MHz signal which is amplified by first and second if. amplifiers A8300 (20) and then applied to the phase discriminator (7) to be compared with the 11.5 MHz signal from modulator A8100 (6). The phase discriminator then produces a correction voltage that is applied to master oscillator A6300.

The audio modulated signal from buffer amplifier A6400 (10) is applied to rf drivers (11) and rf amplifiers (12) for amplification, then fed to rf detector (13). The rf detector is a directional coupler circuit which samples the forward and reflected power components of the rf output signal. The rectified output of the detector is applied to agc amplifier (14). The agc amplifier controls the gain of the transmitted power by increasing or decreasing the signal to rf drivers (11). Increasing the gain from the agc amplifier causes **less** power radiated through the antenna. Decreased gain from the agc amplifier causes **higher** power radiated through the antenna. The agc amplifier controls the gain in the one to ten watt range. Fm rf power from rf detector A6500 is applied through relay K4504 to band-pass filter FL4501 (15A) **or** (15 B). Pressing the push to talk button energizes relay K4501 which puts the radio set in the transmit mode. Band-pass filter FL4501 attenuates harmonics in either the Ⓐ band, 30 MHz – 52.95 MHz, or the Ⓑ band, 53 MHz – 75.95 MHz, depending on the frequency of the transmitted power.

Transmitted power is applied from filter FL4501 through relay K4501 to side tone gate detector A4500 (16). The sidetone gate detector outputs a ground signal which energizes relay K5502 for the purpose of activating audio amplifier A5400 (27). A ground signal from the sidetone gate detector will not be produced to unsquelch the audio amplifier until the power level being transmitted is 0.6 watt or greater. The rf modulated power is also coupled to reflectometer A4500 (17).

When transmitted power reaches at least 0.6 watt, two diode circuits in the reflectometer are activated. One circuit detects forward power and the other detects reflected power. When the test switch on the radio set is in the forward position, current flows through the forward detector and into the TEST METER. When the switch is in the reflected position, current flows through the reflected detector and into the TEST METER to be monitored. Most of the rf power entering the reflectometer is coupled to the antenna to be radiated.

In order for the radio set operator to hear what he is transmitting, the transmitted audio is applied to the receive circuits. The audio modulated 11.5 MHz if. from mixer A1400 (19) is applied through if. attenuator (23) (no attenuation occurs) to first and second if. amplifiers A4100 (24) for amplification. If. is again amplified in third and fourth if. amplifiers of A4200 (25). The hunt cutoff detector located in A4200 is used to rectify the signal and supply a dc bias voltage to hunt generator A8400 (8).

Unmodulated audio intelligence from discriminator A4200 (25) is applied to audio squelch preamp A4300 (26) for initial amplification. The audio from A4300 is applied to audio amplifier A5400 (27) for further amplification. The sidetone gate signal from A4500 (16) allows application of the +16 vdc to the audio amplifier for unsquelching. When unsquelched, the audio intelligence is amplified in the audio amplifier and coupled to interphone amplifier (2) to be heard in earphone (1).

1-34. MASTER OSCILLATOR FREQUENCY CONTROL LOOP.

For proper radio transmitter operation, the fm output of the master oscillator must be within ± 3.5 kHz of the selected channel frequency. To prevent master oscillator frequency drift beyond these limits, a frequency control loop is built into the radio. The electronic modules that comprise the frequency control loop (automatic frequency control) are shown in FO-6.

Correction of master oscillator frequency drift is accomplished in two ways. Slight frequency drift is fine tuned to proper frequency by a dc correction voltage from the phase discriminator. Extreme frequency drift is coarse tuned to proper frequency by a sawtooth voltage from the hunt generator. Fine tuning and coarse tuning of the master oscillator are done as follows.

FINE TUNING

Master Oscillator

Master oscillator (1) outputs rf signals at a frequency corresponding to the channel indicated by the radio's tuning dials. For this discussion it is assumed that the channel selected is 30.00 MHz. Due to master oscillator drift, its rf output is not precisely 30 MHz. This signal is applied to mixer (4) through buffer amplifier (2) and isolation amplifier (3) which prevents excessive loading of the master oscillator.

Mixer

Receiver mixer (4) is used by both the receiver and transmitter for the purpose of heterodyning rf signals. During transmission, the receiver-mixer heterodynes the 30 MHz master oscillator output, which is not necessarily 30 MHz, with the 41.5 MHz output from receiver local oscillator (5). Sum and difference frequencies are generated by the mixer. The difference frequency, which approximates 11.5 MHz, is applied to first and second if. amplifiers (6). The other frequencies are filtered.

Local Oscillator

The local oscillator performs an identical function during reception and transmission. During transmission, when the radio is set to 30.00 MHz, the local oscillator outputs a precise 41.5 MHz signal. Since the local oscillator is prevented from drifting by the crs, the oscillator's output is extremely accurate. The 41.5 MHz signal is applied to the receiver-mixer and heterodyned with the master oscillator's 30 MHz signal to produce an if. signal which varies around 11.5 MHz.

First and Second IF. Amplifiers

First and second if. amplifiers (6) increase the amplitude of the 11.5 MHz intermediate frequency to make the signal strong enough for processing by phase discriminator (8).

11.5 MHz Modulator

The 11.5 MHz modulator (7) provides the fixed 11.5 MHz audio modulated input to the phase discriminator.

1-34. MASTER OSCILLATOR FREQUENCY CONTROL LOOP. (CONT)

Phase Discriminator

The phase discriminator performs the following four functions:

Phase comparison
Correction voltage generation
Demodulation
Filtering

Two rf signals are applied to phase discriminator (8) for comparison. One is the 11.5 MHz signal from first and second if. amplifiers (6). This frequency may not be exactly 11.5 MHz. The other input is an 11.5 MHz signal from 11.5 MHz modulator (7). This signal contains audio intelligence and is precisely controlled at 11.5 MHz by a crystal-controlled oscillator.

A difference in frequencies of rf signals applied to the phase discriminator causes it to generate a dc correction voltage which is applied to the master oscillator circuitry. The dc signal forces the master oscillator back to exactly 30 MHz. At that instant, the difference frequency produced by mixer (4) becomes almost 11.5 MHz, and the phase discriminator no longer outputs a correction voltage.

In actual operating conditions, master oscillator drift causes a constant plus or minus dc correction signal to be generated by the phase discriminator.

The audio intelligence is demodulated by the phase discriminator and rides on the dc correction voltage. This audio signal is applied to the master oscillator to modulate its rf output.

The 11.5 MHz rf signals applied to the phase discriminator are shunted to ground by a series resonant rf trap circuit.

COARSE TUNING

The coarse tuning process is initially identical to the fine tuning process and follows the same signal path up to mixer. However, at the mixer, a different chain of events begins to occur.

Mixer

The 11.5 MHz output of the mixer is applied to receiver if. amplifiers (10).

Receiver IF. Amplifiers

Receiver if. amplifier module A4000 is used during reception and transmission. Two 11.5 MHz filters wired in series with the if. amplifiers attenuate rf signals other than 11.5 MHz. Therefore, the if, amplifiers produce highest amplitude signal from an 11.5 MHz input. As the input varies above or below 11.5 MHz, the if. amplifiers' output drops in amplitude.

When the master oscillator is running almost exactly on proper frequency, the mixer's difference frequency is very close to 11.5 MHz. This signal, applied to if. amplifiers (10), results in minimum attenuation by the filters and maximum amplifier gain. The high amplitude output of the receiver's fourth if amplifier is applied in parallel to hunt the cutoff detector within module A4200.

1-34. MASTER OSCILLATOR FREQUENCY CONTROL LOOP. (CONT)

The hunt cutoff detector is basically a diode clipper and a filter, which clips off the negative half of the rf sine wave, filters it, and outputs a constant positive dc level. This dc level is applied to the hunt generator where it biases off the sawtooth generator. Consequently, no sawtooth voltage is applied to the master oscillator.

When the master oscillator drifts off frequency, the mixer's difference frequency moves further away from 11.5 MHz. Consequently, the if. filters attenuate the signal, causing reduced amplification by the receiver if. amplifiers. If the master oscillator is far enough off frequency (± 400 kHz or more), the positive half of the rf sine wave clipped by the hunt cutoff detector is very low in amplitude, resulting in a reduced dc level applied to hunt generator (9).

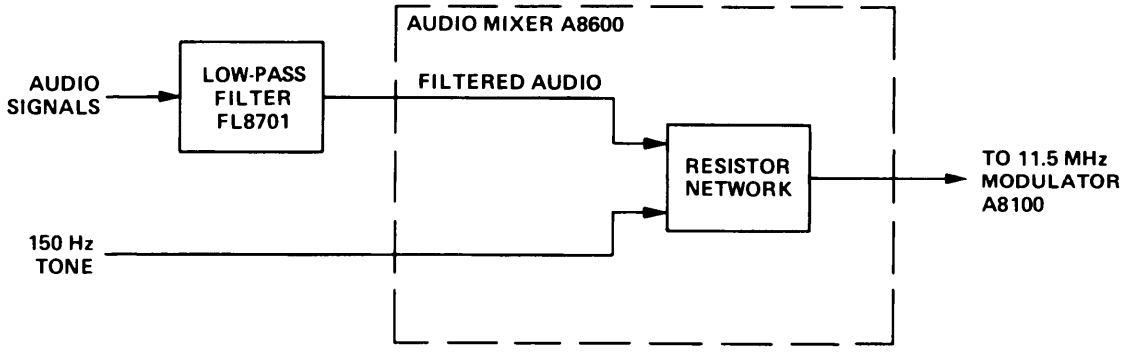
The reduced dc signal is not strong enough to bias the sawtooth generator off, so it begins to output a sawtooth voltage.

Hunt Generator

The sawtooth generator in the hunt detector applies a sawtooth voltage to the master oscillator when its frequency varies from the mechanically selected frequency by more than ± 400 kHz. The sawtooth voltage brings the master oscillator close enough to the correct frequency for the phase discriminator to fine tune it.

Output from the hunt generator occurs primarily when the tuning dials are switched to another frequency. Once the phase discriminator takes over master oscillator frequency control, the sawtooth generator is once again biased off.

1-35. AUDIO MIXER MODULE A8600.

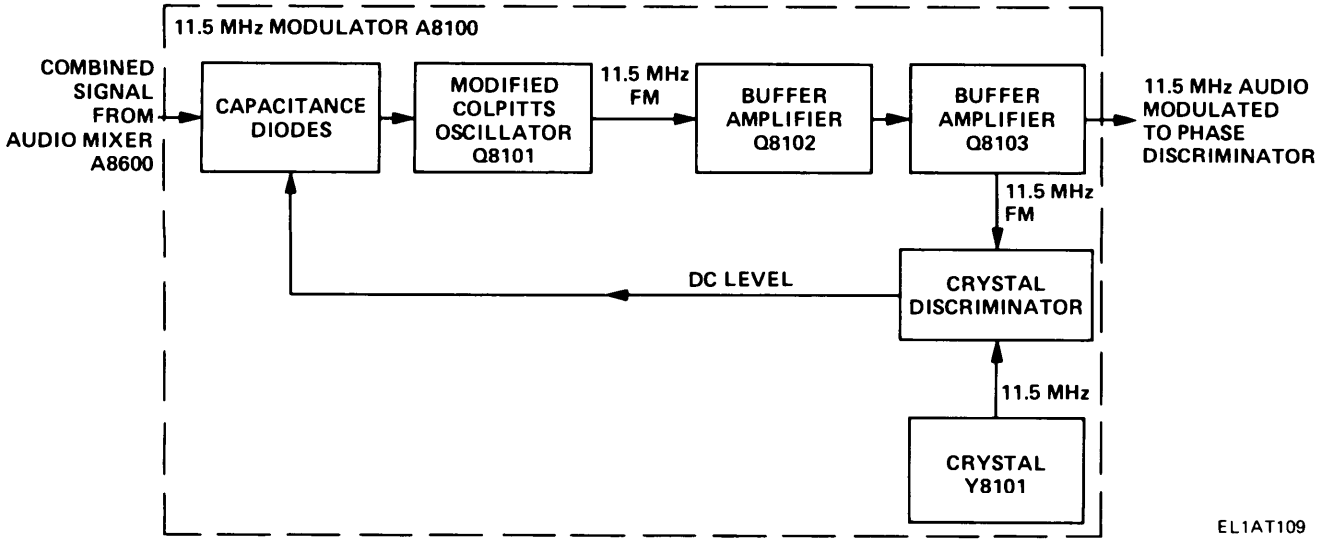


EL1AT108

Audio signals from the interphone amplifier are applied through low-pass filter FL8701 whose main function is to attenuate signals above 3000 Hz. The 150 Hz signal generated in squelch amplifier A5200 is applied to the resistor network and combined with the filtered audio.

The 150 Hz tone signal from squelch amplifier A5200 is always generated in transmit mode. The combined signals are applied to module A8100.

1-36. 11.5 MHZ MODULATOR MODULE A8100.



EL1AT109

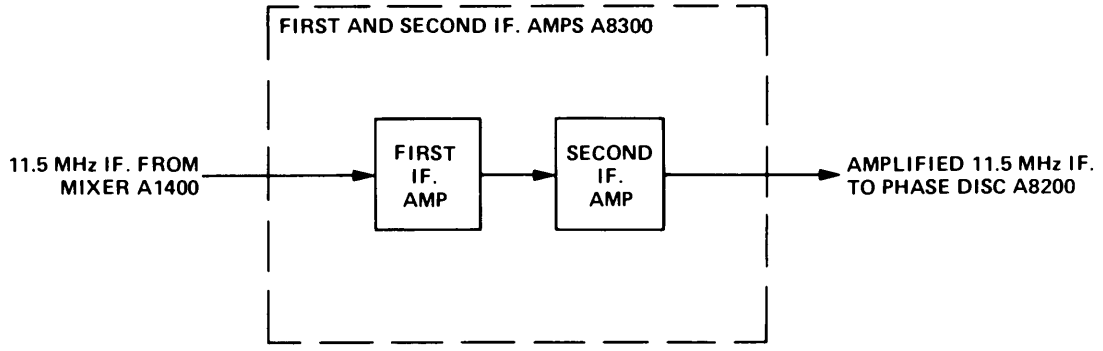
1-36. 11.5 MHz MODULATOR MODULE A8100. (CONT)

The combined signal from the audio mixer is applied to the capacitance diodes which causes the frequency of oscillator Q8101 to deviate. Fm 11.5 MHz output from Q8101 is applied to buffer amps Q8102 and Q8103 for amplification, and then applied to phase discriminator A8200.

The 11.5 MHz fm signal from buffer amplifier Q8103 is also applied to the crystal discriminator. The crystal discriminator compares 11.5 MHz fm with 11.5 MHz from crystal Y8101.

If oscillator Q8101 drifts above or below 11.5 MHz, the crystal discriminator will apply a positive or negative dc voltage to the capacitance diodes, correcting the 11.5 MHz frequency.

1-37. FIRST AND SECOND IF. AMPLIFIERS MODULE A8300.

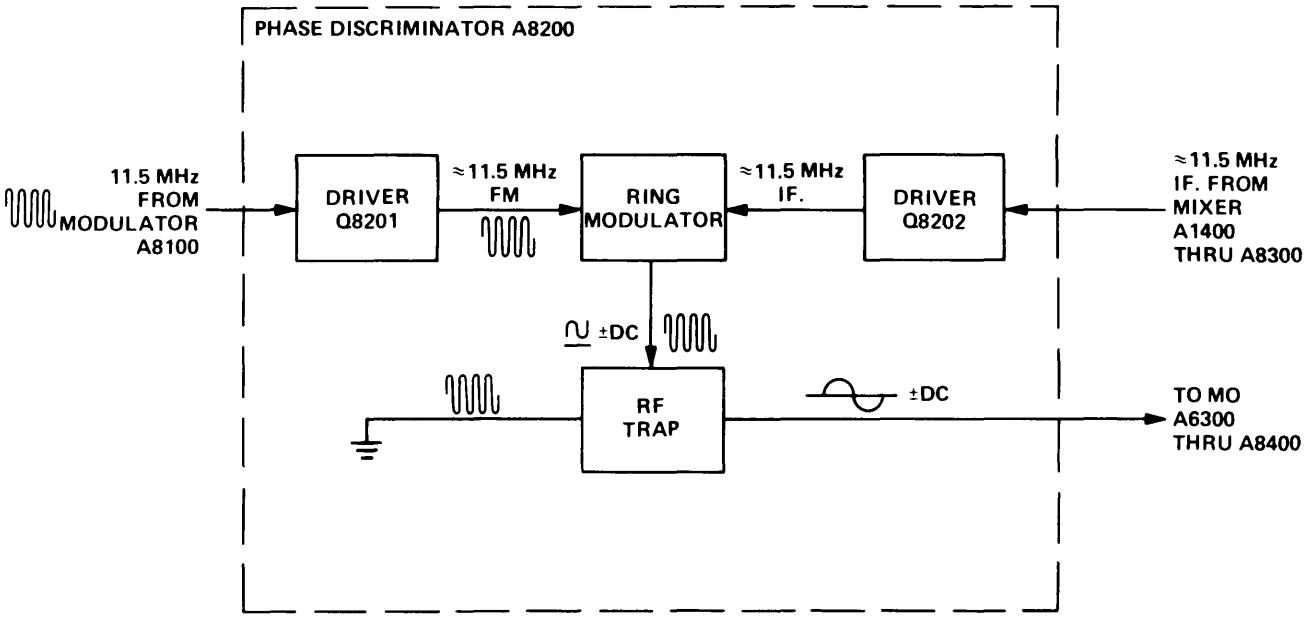

FIRST AND SECOND IF. AMPS A8300
11.5 MHz IF. FROM MIXER A1400
FIRST IF. AMP
SECOND IF. AMP
AMPLIFIED 11.5 MHz IF. TO PHASE DISC A8200

EL1AT11O

11.5 MHz if. from mixer A1400 is applied to the first and second if. amplifiers for amplification.

Unmodulated 11.5 MHz if. is applied from the second if. amp to phase discriminator module A8200.

1-38. PHASE DISCRIMINATOR MODULE A8200.



Ring modulator in A8200 accepts two different signals.

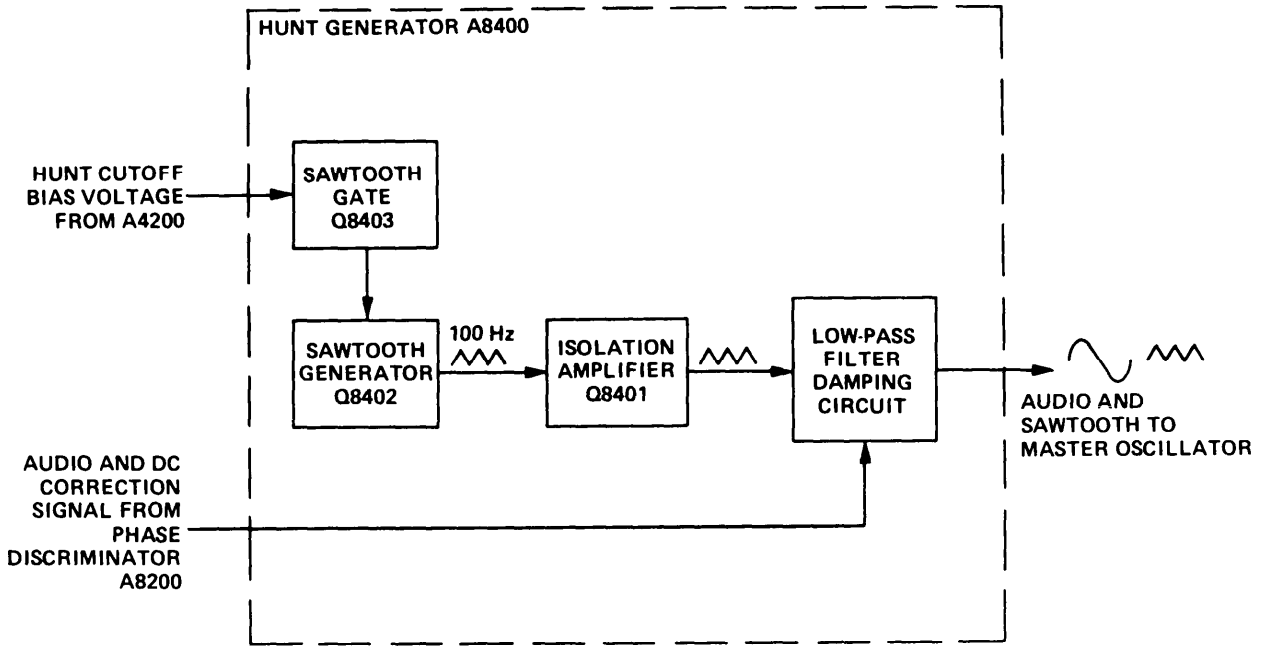
11.5 MHz audio modulated signal from 11.5 MHz modulator A8100.
11.5 MHz unmodulated if. signal from mixer A1400 through A8300.

Two 11.5 MHz signals are amplified by the drivers and applied to the ring modulator. The ring modulator produces both an audio output, determined by the modulation, and a dc voltage, determined by the difference between the two radio frequencies. The audiofrequency and dc voltage is applied from the rf trap through a low-pass filter in hunt generator A8400 to the master oscillator.

The 11.5 MHz rf carrier is shunted to ground by the series tuned rf trap.

The function of phase discriminator module A8200 is explained in detail in paragraph 1-34.

1-39. HUNT GENERATOR MODULE A8400.


HUNT GENERATOR A8400
HUNT CUTOFF BIAS VOLTAGE FROM A4200
SAWTOOTH GATE Q8403
SAWTOOTH GENERATOR Q8402
100 Hz
ISOLATION AMPLIFIER Q8401
LOW-PASS FILTER DAMPING CIRCUIT
AUDIO AND SAWTOOTH TO MASTER OSCILLATOR
AUDIO AND DC CORRECTION SIGNAL FROM PHASE DISCRIMINATOR A8200

EL1AT112

The manner in which the hunt generator controls master oscillator frequency drift is discussed in paragraph 1-34. The following information covers operation of its subassemblies.

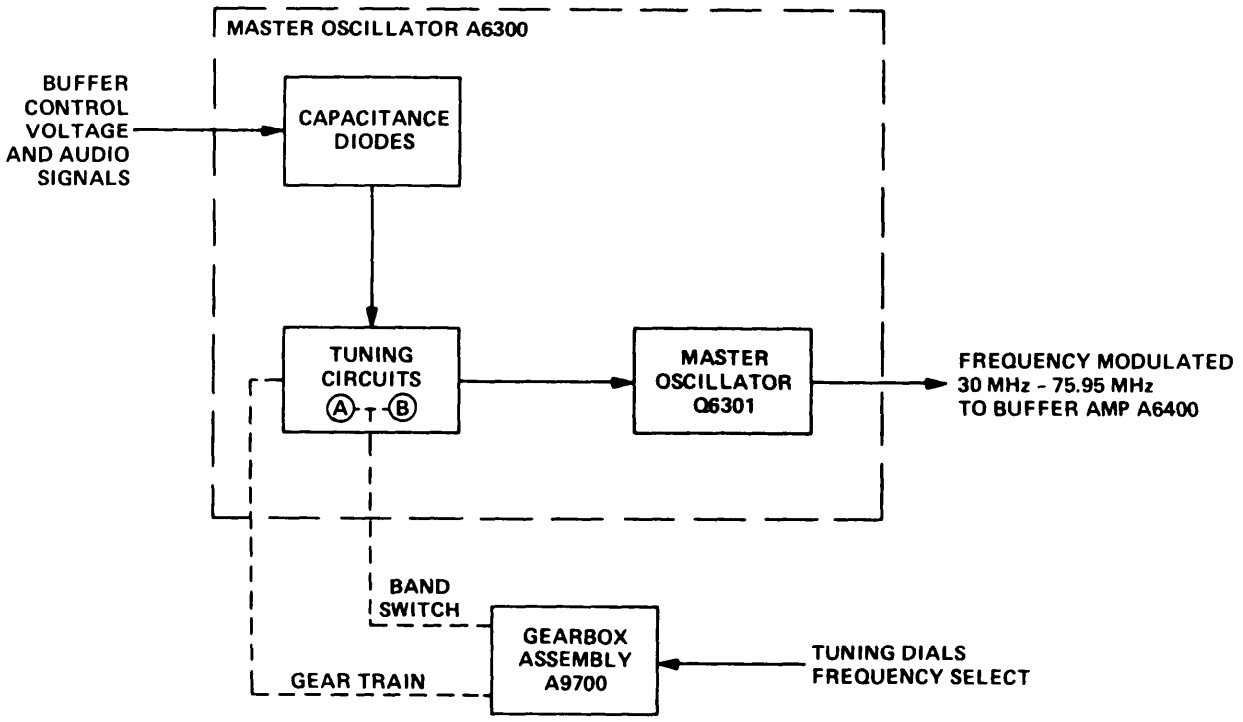
When the master oscillator frequency shifts beyond the correcting range of the phase discriminator, the bias voltage from the hunt cutoff detector in module A4200 is removed, causing the sawtooth gate to stop conducting.

When sawtooth gate Q8403 stops conducting, the voltages applied to sawtooth generator Q8402 increase causing the 100 Hz sawtooth voltage to be generated.

The 100 Hz voltage is applied through isolation amplifier Q8401 and the low-pass filter to the master oscillator for frequency correction. Once the master oscillator frequency is brought into the correcting range of the phase discriminator, the hunt cutoff bias voltage from A4200 is then reapplied, turning on Q8403. When Q8403 is on, no sawtooth voltage in Q8402 is generated.

Isolation amplifier Q8401 isolates the sawtooth generator from the phase discriminator. The low-pass filter attenuates frequencies above 11.5 MHz and prevents generation of spurious signals in the frequency control loop.

1-40. MASTER OSCILLATOR MODULE A6300.



EL1AT113

The capacitance diodes in the A6300 module accept four signals.

1. 100 Hz sawtooth voltage from hunt generator A8400
2. ± dc correction voltage from the phase discriminator A8200
3. Voice signals riding on the ± dc correction voltage
4. 150 Hz tone signal generated in the squelch amplifier A5200

BUFFER CONTROL VOLTAGE

The buffer control voltage consists of 100 Hz sawtooth voltage and ± dc correction voltage. This voltage, applied to the capacitance diodes, corrects the frequency of the master oscillator.

TUNING CIRCUITS

The tuning circuits are separated into two bands, an (A) band, 30 MHz – 52.95 MHz, and a (B) band, 53 MHz – 75.95 MHz. The band switch in gearbox assembly A9700 mechanically selects either band, depending on the operator selected frequency. Resonant circuits comprised of inductors and capacitors allow the master oscillator to generate the selected frequency. When the operator rotates the tuning dials for a different channel, the gear train in A9700 mechanically alters the inductance of resonant circuits causing the master oscillator to change its frequency.

1-40. MASTER OSCILLATOR A6300. (CONT)

CAPACITANCE DIODES

The capacitance diodes are reverse-biased at 6.3 vdc. Any change in bias causes the effective capacitance of the diodes to change. The correcting voltages applied to the diodes alter the capacitance which changes the effective capacitance in the tuning circuits. This change in the tuning circuits changes the master oscillator operating frequency.

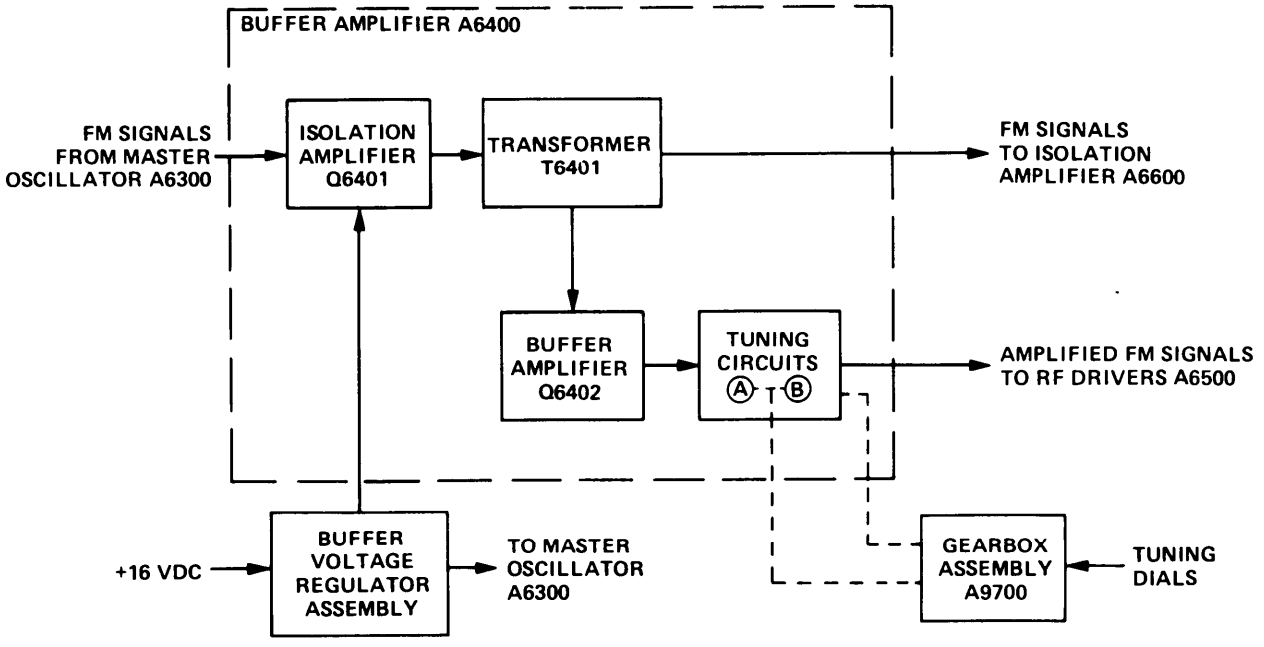
The diodes also accept voice signals and 150 Hz tone signals. These signals alter the capacitance of the diodes and tuning circuits, producing frequency modulation of the master oscillator frequency.

MASTER OSCILLATOR

The master oscillator is a pnp transistor designed into a modified colpitts configuration. Its operating frequency range, 30 MHz - 75.95 MHz, is the receiver-transmitter operating frequency range.

Fm signals from the master oscillator are applied to buffer amp A6400.

1-41. BUFFER AMPLIFIER MODULE A6400 AND REGULATOR ASSEMBLY.



EL1AT114

1-41. BUFFER AMPLIFIER MODULE A6400 AND REGULATOR ASSEMBLY. (CONT)

BUFFER AMPLIFIER

The output of master oscillator A6300 is applied to isolation amplifier Q6401 which isolates the master oscillator to maintain frequency stability. Amplified signals from Q6401 are developed in the two secondary windings of transformer T6401.

One secondary winding couples the signal to isolation amplifier module A6600 and the other winding applies the same signal to buffer amplifier Q6402 in module A6400.

Buffer amp Q6402 amplifies the signal and applies it through the tuning circuits to the rf drivers in module A6500.

The mechanically tuned circuits function identical to those contained in the master oscillator module.

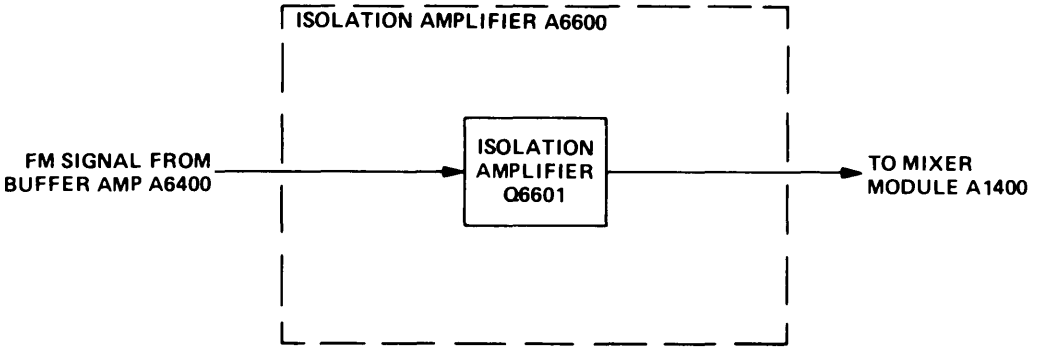
BUFFER VOLTAGE REGULATOR ASSEMBLY

The buffer voltage regulator assembly provides 10.3 and 6.3 vdc to the master oscillator and isolation amplifier stages. An input voltage of + 16 vdc is supplied to the regulator through relay K9603 when the radio set transmission section is activated.

Zener diodes contained in the regulator assembly provide regulated 10.3 and 6.3 voltages to the master oscillator and isolation amplifier when + 16 vdc is supplied.

The 10.3 and 6.3 vdc are used for the purpose of biasing the stages.

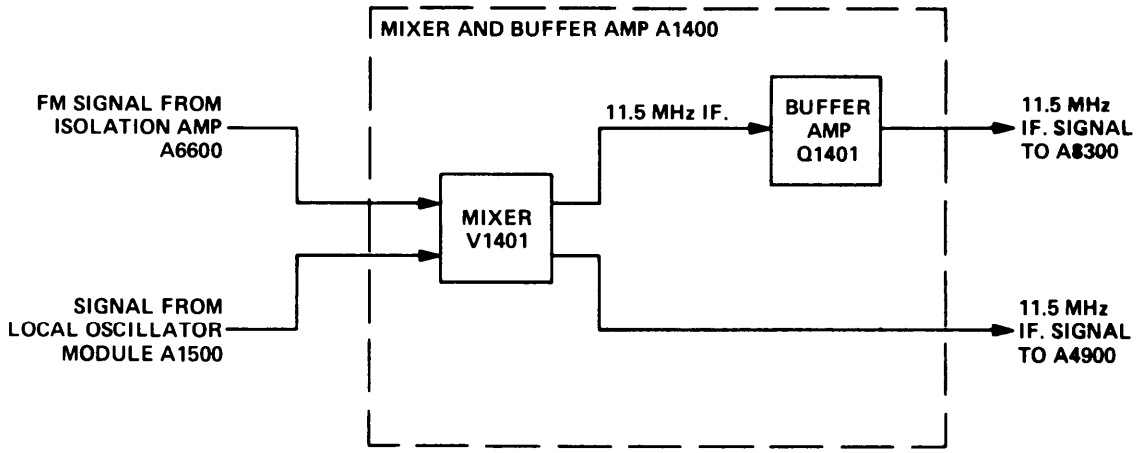
1-42. ISOLATION AMPLIFIER MODULE A6600.



EL1AT115

Frequency modulated signals from buffer amp A6400 are applied to isolation amplifier Q6601 for amplification and applied to mixer module A1400. Q6601 also prevents undesired signals from local oscillator A1500 mixed in A1400 from feeding back into buffer amp A6400, causing spurious outputs.

1-43. MIXER AND BUFFER AMPLIFIER A1400 (TRANSMIT MODE).


MIXER AND BUFFER AMP A1400
FM SIGNAL FROM ISOLATION AMP A6600
SIGNAL FROM LOCAL OSCILLATOR MODULE A1500
MIXER V1401
11.5 MHz IF.
BUFFER AMP Q1401
11.5 MHz IF. SIGNAL TO A8300
11.5 MHz IF. SIGNAL TO A4900

EL1AT116

In transmit mode, mixer V1401 receives two signals:

Frequency modulated signals from isolation amplifier A6600.
The signal from local oscillator module A1500.

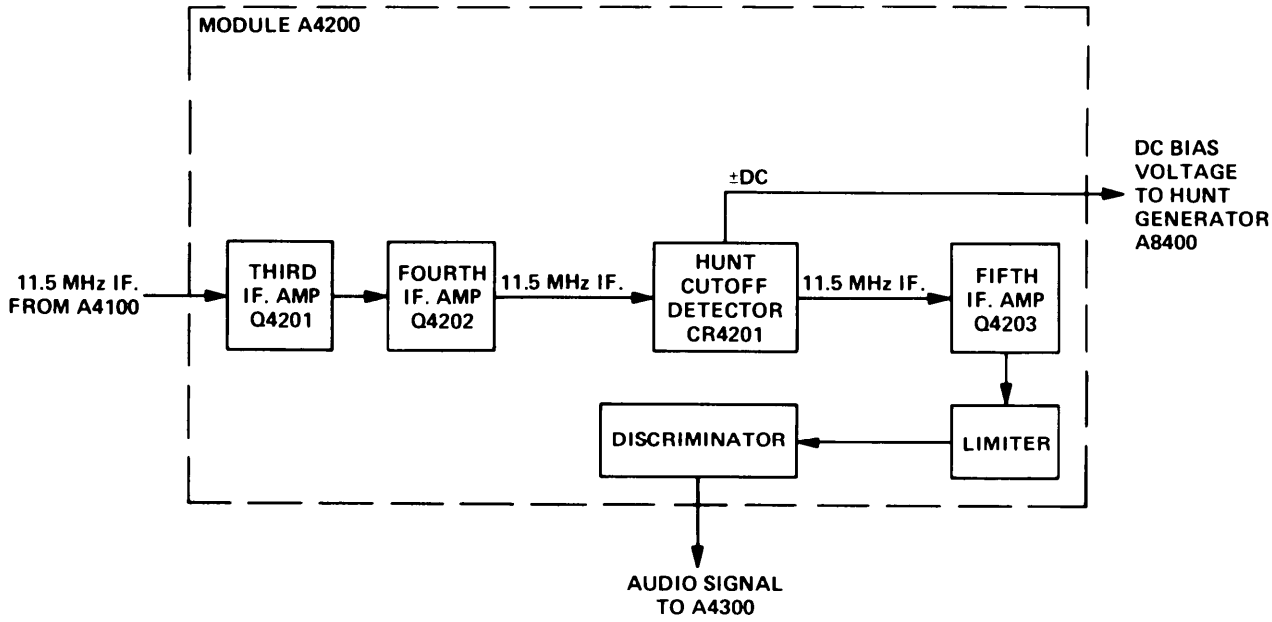
The mixer heterodynes the two signals and applies a modulated 11.5 MHz if. signal to if. attenuator A4900 and first and second if. amplifier A8300 through buffer amp Q1401.

Buffer amp Q1401 operates only in the transmit mode. During transmission, +16 vdc is applied, for biasing, to the buffer amp through relay K9603. The amplifier provides sufficient amplification to drive first and second if. amplifier A8300.

The signals applied from mixer A1400 to A8300 are discussed in the master oscillator frequency control loop in paragraph 1-34.

The mixer applies a modulated 11.5 MHz if. signal through the receiver circuits for the purpose of allowing the radio set operator to hear what he is transmitting. This signal is applied from the mixer through A4900 and A4100 to module A4200.

1-44. HUNT CUTOFF DETECTOR P/O MODULE A4200.



EL1AT117

Frequency modulated 11.5 MHz if. from module A4100 enters the hunt cutoff detector from the fourth if. amp. The hunt cutoff detector rectifies the signal and applies a dc bias voltage to hunt generator A8400. 11.5 MHz if. is also coupled to the fifth if. amp and then proceeds through the receiver circuitry.

The dc bias voltage is applied to the hunt generator only if 11.5 MHz if. is present at the fourth if. amp output. If the master oscillator shifts frequency substantially, the if. signal at the hunt cutoff detector will be lost and the dc bias voltage supplied to the hunt generator will be removed. Removal of the dc bias voltage activates the hunt generator which supplies an error voltage to the oscillator circuits to correct the operating frequency. Presence of the 11.5 MHz if. signal causes the hunt cutoff detector to bias off the hunt generator. For a discussion of the master oscillator frequency control loop, see paragraph 1-34.

The hunt cutoff detector operates in transmit and homing modes. For a discussion of the detector operating in homing mode, see paragraph 1-50.

1-45. AUDIO AMPLIFIER MODULE A5400 (TRANSMIT MODE).

Refer to FO-4 while reading the text in this paragraph.

Amplified audio signals from squelch preamplifier A4300 are applied to amplifier Q5401 (1) in the audio amplifier for amplification.

In transmit mode, a transmit ground signal is applied to X2 of relay K5501, causing B2 and B1, and A2 and A1, to make contact.

When B1 and B2 make contact, the amplified output of Q5401 is applied to low-pass audio filter FL5501 (2) only. The filter passes frequencies below 3 kHz and applies the filtered audio through potentiometer R5405 (3) to amplifier Q5403 (4).

The sidetone gate signal from the sidetone gate detector is applied through A1 and A2 of relay K5501 to X2 of relay K5502. Relay K5502 becomes energized causing A1 and A2 to make contact. +16 vdc is then applied to the amplifiers to unsquelch the receiver and allow the audio signals to be amplified. Once amplified, the audio is coupled through transformer (7) and interphone amp and heard in the headset.

1-46. SQUELCH AMPLIFIER MODULE A5200 (TRANSMIT MODE).

Refer to FO-4 while reading the text in this paragraph.

The squelch amplifier's function in the transmit mode is to generate a 150 Hz tone signal that can be transmitted to an unsquelch receiver.

The 150 Hz tone signal is generated using four transistors in the squelch amplifier and a phase shift network in the audio amplifier. The tone oscillator consists of Q5201 (11), Q5202 (16), Q5203 (12), Q5204 (13), and a phase shift network (23). All of these components are connected in a feedback loop that oscillates at 150 Hz.

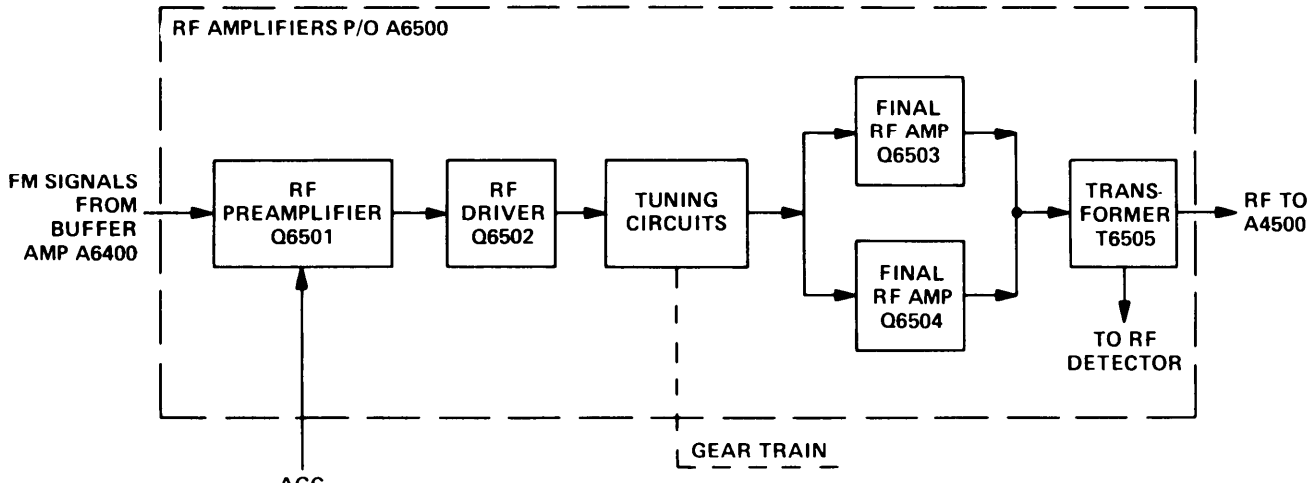
When the radio set is in transmit mode, B2 and B1 of relay K5501 make contact, applying the output of phase shift network (23) from Q5204 (13), to Q5201 (11): The 150 Hz tone is applied from B1 of relay K5501 to audio mixer A8600, where it is combined with the audio signals to modulate the 11.5 MHz modulator frequency.

1-47. AUTOMATIC GAIN CONTROL (AGC).

The agc amplifiers in module A6500 insure that a constant level of rf output power is being transmitted. Agc action will keep the level of audio being heard in a distant receiver constant, even though varying levels of voice signals from the transmitter operator are entering the microphone.

1-48. RF AMPLIFIER ASSEMBLY MODULE A6500.

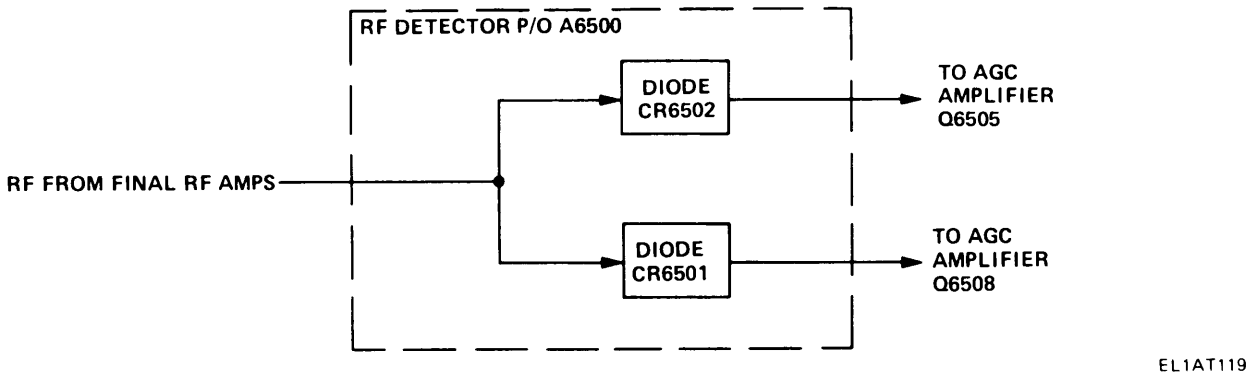
RF AMPLIFIERS



Frequency modulated signals from the master oscillator are applied through buffer amp A6400 to module A6500. Signals entering A6500 are applied to Q6501 and Q6502 for amplification. The tuning circuits, adjusted mechanically by the gear train, tune rf driver Q6502 for maximum gain which provides driving power for the final rf amp stages.

Amplified fm from the push-pull network of Q6503 and Q6504 is coupled through transformer T6505 and applied to module A4500 and the rf detector in module A6500.

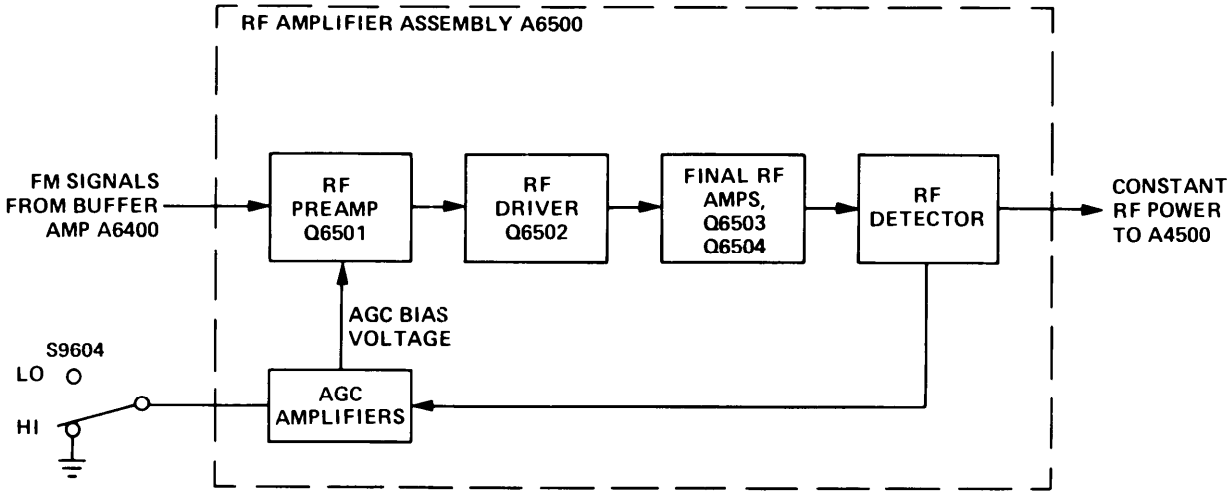
RF DETECTOR



1-48. RF AMPLIFIER ASSEMBLY MODULE A6500. (CONT)

The rf detector is a directional coupler circuit that samples the forward and reflected power components of the rf output signal. The voltages from the final rf amp stage are rectified by diodes CR6501 and CR6502 and applied to the agc amplifiers.

AGC AMPLIFIERS



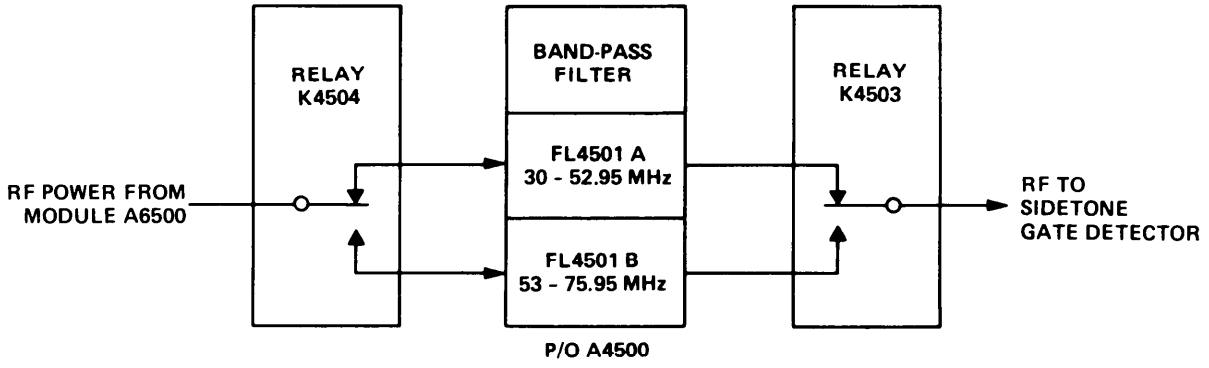
EL1AT120

The rf and agc amplifiers form a feedback loop which ensure a constant level of rf output to module A4500. The power output level desired for a specific application may be selected at the receiver-transmitter front panel by setting XMTR HI-LO power switch S9604 to either of two positions. In the **LO** position, the output level to A4500 is held to 1 watt. In the **HI** position, agc action is held to a minimum and the output power is increased to 10 watts.

With switch S9604 in LO position, a larger signal is applied from the rf detector agc amplifiers. A larger signal entering the agc amplifiers causes a decreased current level entering rf preamp Q6501. Having a decreased current level, conduction of Q6501 decreases, holding the rf output to A4500 at 1 watt.

With switch S9604 in HI position, a reduced signal is applied to the agc amplifiers. A reduced signal entering the agc amplifiers causes an increased current level to Q6501. Increased current causes conduction of Q6501 to increase, bringing the rf output power to 10 watts.

1-49. RF CONTROL ASSEMBLY P/O MODULE A4500 (TRANSMIT MODE).

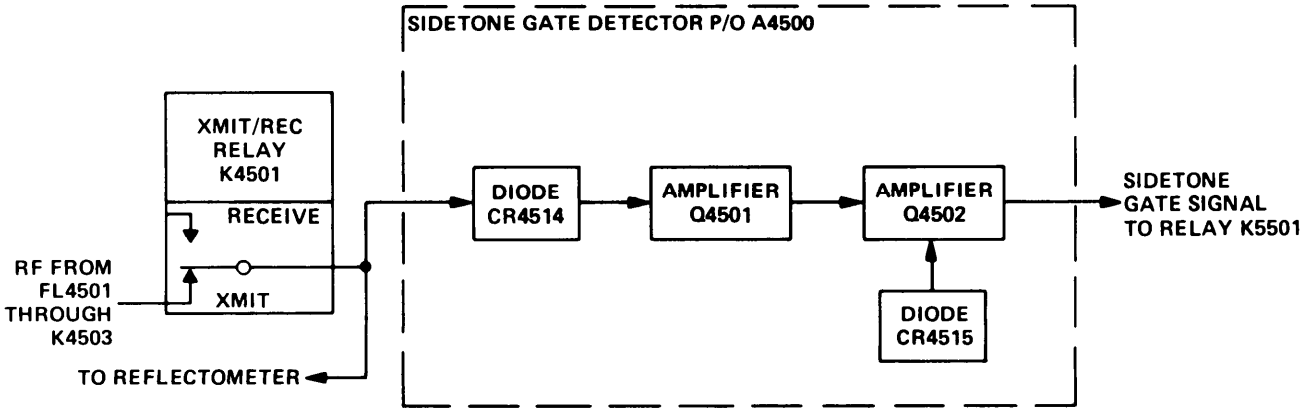


EL1AT121

Band-pass filter FL4501A filters out harmonics of all transmitted signals in the frequency range of 30.00 MHz to 52.95 MHz. Band-pass filter FL4501 B attenuates harmonics of all transmitted signals in the frequency range of 53.00 MHz – 75.95 MHz. The overall function of the filter is to attenuate all harmonics of the passband frequencies (30 MHz – 75.95 MHz) while offering minimum loss to the passband frequencies.

Frequency modulated rf power from A6500 flows through relay K4504 to, depending on the transmitted frequency, FL4501A or FL4501 B. The filtered power then flows through relay K4503 to the sidetone gate detector.

SIDETONE GATE DETECTOR



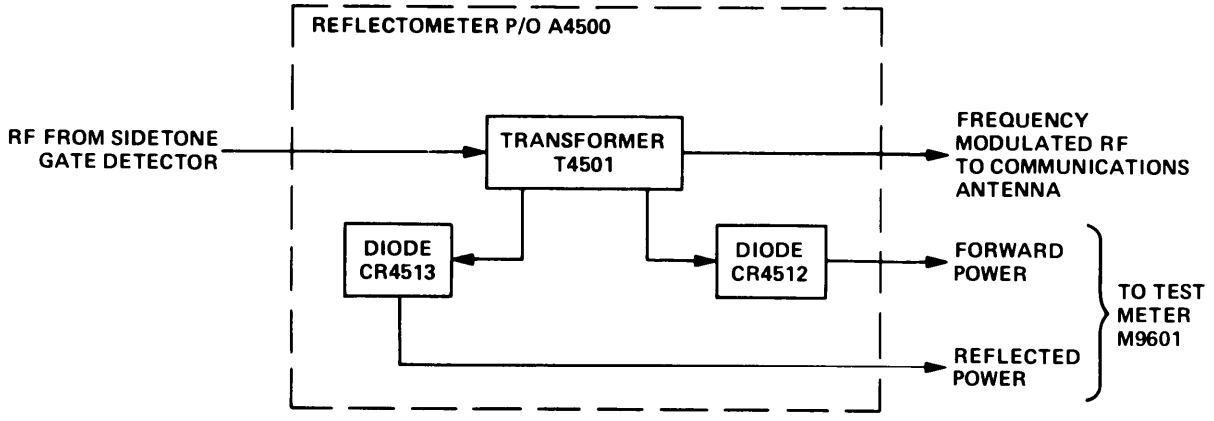
EL1AT122

1-49. RF CONTROL ASSEMBLY P/O MODULE A4500 (TRANSMIT MODE). (CONT)

When the push-to-talk button is pressed, transmit/receive relay K4501 is energized, allowing transmitted rf to flow to the sidetone gate detector and reflectometer from band-pass filter FL4501.

Rf signals entering the detector are rectified by diode CR4514 and applied to amplifier Q4501. Amplifiers Q4501 and Q4502 will not conduct until 0.6 watt biases diode CR4514. When transmitted power reaches 0.6 watt or higher, Q4501 and Q4502 conduct sending a ground signal (sidetone gate signal) to relay K5501, energizing it. Energizing K5501 causes relay K5502 to apply the + 16 vdc to audio amplifier A5400 for unsquelching.

REFLECTOMETER



EL1AT123

Rf signals being applied to the sidetone gate detector are also applied to transformer T4501 in the reflectometer. Rf is coupled through the primary of T4501 to the communications antenna and is radiated.

The secondary of transformer T4501 couples a portion of the output power to diodes CR4513 and CR4512. CR4513 detects reflected power and CR4512 detects forward power. In order for power to reach the test meter from either diode, power being coupled from transformer T4501 to the diodes must be at least 0.6 watt.

1-50. HOMING SIGNAL FLOW.

Homing operation is available on any of 920 channels in the frequency range of 30.00 to 75.95 MHz. The homing circuit provides information to the aircraft homing indicator concerning the aircraft heading with respect to a transmitting station. To follow the homing circuits signal path, see FO-7 while reading the text in this paragraph.

When the control unit mode selector switch is set to HOME, + 27.5 vdc is connected through the control unit causing relay K4502 in rf control assembly A4500 to energize. Relay K4502 in turn applies + 16 vdc to energize the homing circuits.

Input signals from left and right homing antennas (1) are applied through diode switch (2) to rf attenuator (3). 100 Hz oscillator (4) alternately injects the two signals from the antennas into the rf attenuator circuit at a 100 Hz rate. The rf attenuator, controlled by a voltage from homer rf agc amplifier (14), attenuates strong received signals that may damage the receiver circuitry. Output signals from the rf attenuator are applied through homing relay K4502 to antenna tuning and protection circuits (5).

Gearbox assembly A9700 (6) tunes the circuits for the received signal which are applied to first rf amp (7) for amplification. Amplified rf is amplified further in second rf amplifier (8) and then applied to mixer (9) to be heterodyned with the frequency of local oscillator (10).

The 11.5 MHz if. output of mixer A1400 is applied to if. attenuator (11) which reduces the signal level in the homing mode. The if. attenuation prevents overloading under the strongest operating conditions. The output of the if. attenuator is coupled through band-pass filter FL4001 (12) and the signal is processed through the remaining portion of the receiver as indicated in paragraph 1-13, except that the am components of the if. signal (if.-am signal) is detected in the fourth if. amp by the hunt cutoff detector p/o module A4200 (13).

The if. am signal from the hunt cutoff detector is applied to rf agc amp (14), if. agc amp (15), and off-course signal amp (16). The homer rf agc amplifier supplies agc voltage to rf attenuator circuit (3) which controls the gain of the received signal. Homer if. agc amp (15) supplies agc voltage to if. attenuator (11) which controls the gain of the 11.5 MHz if. signal.

Off-course signal amplifier (16) amplifies the if.-am signal and applies it to synchronous detector (17). The synchronous detector compares the if.-am signal with the 100 Hz square wave produced by 100 Hz oscillator (4) and applies a dc signal to the homing indicator vertical needle.

1-50. HOMING SIGNAL FLOW. (CONT)

The application of the dc signal to the vertical needle of the homing indicator provides the pilot with information to fly left or right.

The if. signal in the if. agc amplifier (15) is applied to the homer signal strength amplifier (18) which supplies a dc signal to the homing indicator horizontal needle.

The homing indicator horizontal needle provides a visual indication of relative signal strength which, in turn, allows the pilot to determine if the aircraft is heading toward or away from the transmitting station.

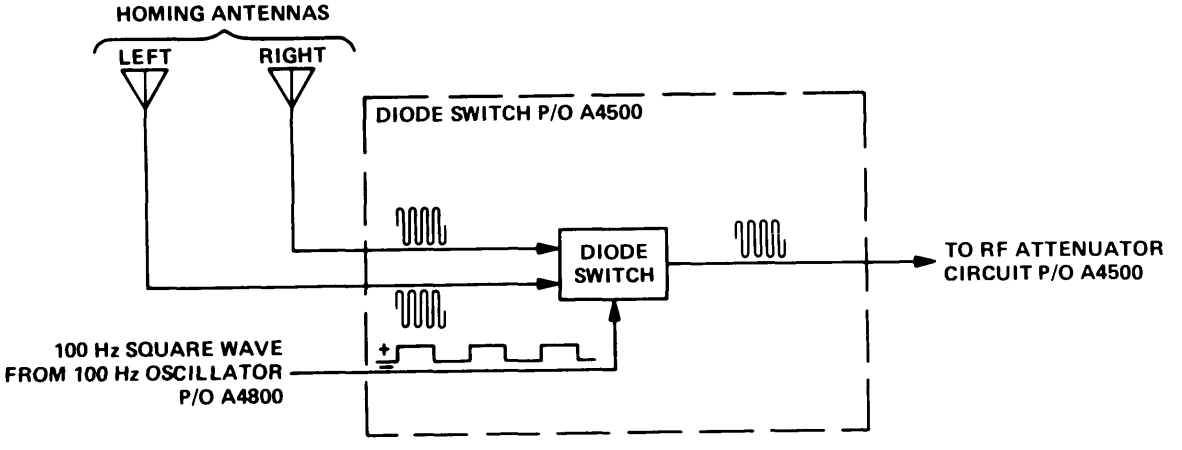
In the homing mode of operation, audio heard in the operator's headset contains some background noise and does not have the same quality as in the receive operating mode. However, the voice signals are intelligible and distortion is not noticeable unless the signals are of a very low level.

The radio set is capable of transmitting audio signals while the control unit mode selector switch is set at HOME. If the push-to-talk button is pressed while the radio set is operating in the homing mode, relay K4502 deenergizes and removes the output of the homing antennas from the input of the antenna tuning and protection circuits of module A1100. Simultaneously, relay K4501 (not shown) becomes energized and connects the communications antenna to the receiver-transmitter. Upon termination of the transmit command, the receiver-transmitter will automatically return to the homing mode.

Squelch amplifier A5200 (19) supplies a flag alarm ground signal to the homing indicator. When the received signal is of sufficient strength, the squelch amplifier supplies a ground to relay K5502 (not shown), energizing it. When energized, this relay applies a ground signal to the homing indicator to drop the flags. When the relay is deenergized, the alarm flags raise, indicating that the homing signal is too weak to provide proper homing information to the homing indicator.

1-51. RF CONTROL ASSEMBLY P/O MODULE A4500 (HOMING MODE).

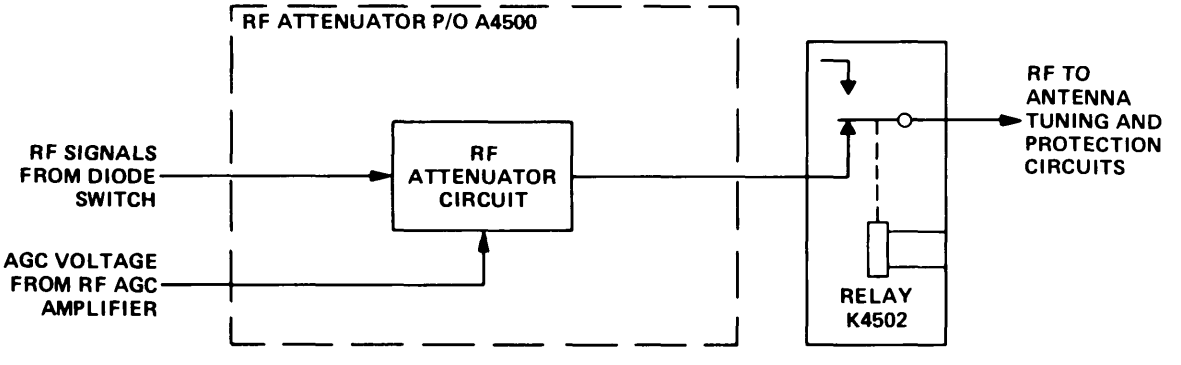
DIODE SWITCH



EL1AT125

Rf signals entering the left and right homing antennas are alternately switched through the diode switch to the rf attenuator circuit at a 100 Hz rate. The 100 Hz square wave from the 100 Hz oscillator is used to bias the diodes in the diode switch. When the square-wave bias voltage is **positive(+),** rf signals from the **left** homing antenna are coupled through the diode switch to the rf attenuator circuit. When the wave becomes **negative** (-), rf signals from the **right** homing antenna are coupled to the rf attenuator.

RF Attenuator


RF ATTENUATOR P/O A4500
RF SIGNALS FROM DIODE SWITCH
RF ATTENUATOR CIRCUIT
AGC VOLTAGE FROM RF AGC AMPLIFIER
RELAY K4502
RF TO ANTENNA TUNING AND PROTECTION CIRCUITS

EL1AT126

1-51. RF CONTROL ASSEMBLY P/O MODULE A4500 (HOMING MODE). (CONT)

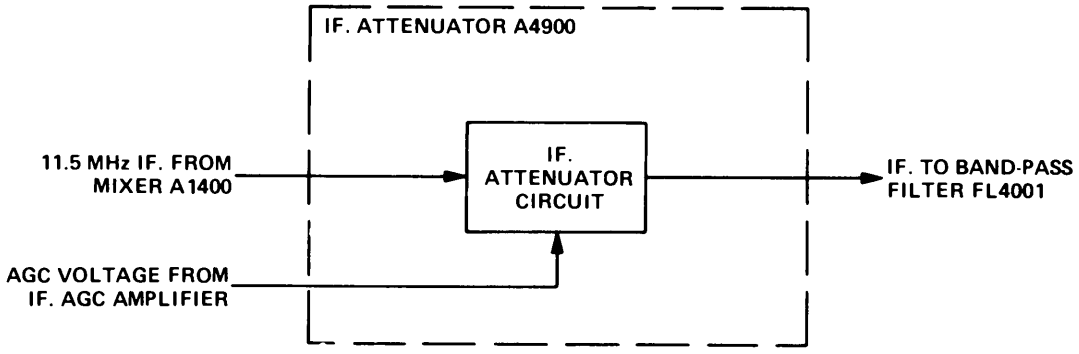
The rf attenuator circuit operates only in homing mode and is controlled by agc voltage from the homer rf agc amplifier.

When low level homing signals are applied from the diode switch to the rf attenuator, agc voltage from the agc amplifier increases, allowing signals to pass with no attenuation. As the homing signal level increases, agc voltage decreases causing the attenuator output level to decrease.

The rf attenuator has a signal loss approaching 40 db with low agc input voltage. The 40 db attenuation of the homing signal is sufficient to prevent overload under the strongest signal operating conditions.

Rf signals from the rf attenuator circuit are applied through energized relay K4502 to the antenna tuning and protection circuits.

1-52. IF. ATTENUATOR MODULE A4900 (HOMING MODE).


IF. ATTENUATOR A4900
11.5 MHz IF. FROM MIXER A1400
IF. ATTENUATOR CIRCUIT
IF. TO BAND-PASS FILTER FL4001
AGC VOLTAGE FROM IF. AGC AMPLIFIER

EL1AT127

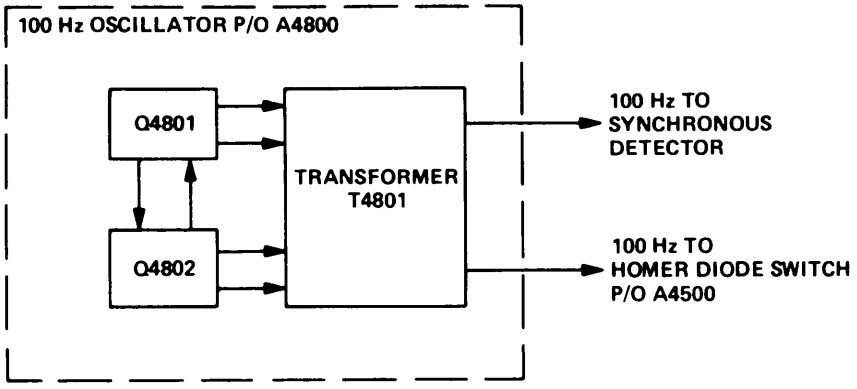
The if. attenuator attenuates signals only in homing mode and is controlled by agc voltage from the homer if. agc amplifier.

When low level homing signals are applied from the mixer to the if. attenuator, if. agc voltage increases to approximately 10 volts which causes the if. homing signals to pass with minimum attenuation. As the homing signal level increases, the agc voltage decreases, causing the attenuator output level to decrease. With low agc voltage applied to the attenuator circuit, the attenuator has a signal loss of approximately 40 db.

11.5 MHz if. homing signals from the if. attenuator are applied to filter FL4001.

1-53. HOMER-DETECTOR AMPLIFIER ASSEMBLY A4800.

100 Hz OSCILLATOR

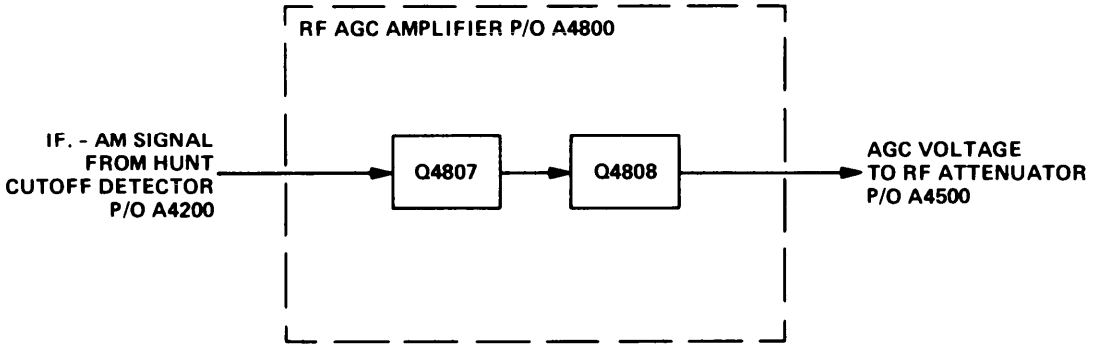


EL1AT128

Transistors Q4801 and Q4802 form a common base square-wave oscillator having an output frequency of 100 Hz.

Transformer T4801 couples the 100 Hz square wave to the synchronous detector and homer diode switch.

RF AGC AMPLIFIER


RF AGC AMPLIFIER P/O A4800
IF. - AM SIGNAL FROM HUNT CUTOFF DETECTOR P/O A4200
Q4807
Q4808
AGC VOLTAGE TO RF ATTENUATOR P/O A4500

EL1AT129

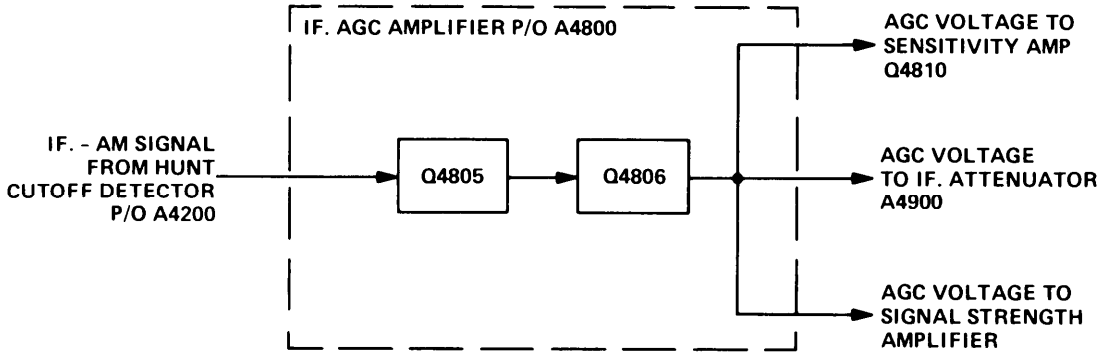
1-53. HOMER-DETECTOR AMPLIFIER ASSEMBLY A4800. (CONT)

The homer if. signal from the hunt cutoff detector in the fourth if. amplifier is applied to rf agc amplifier Q4807. With weak received signals, conduction of transistor Q4807 is slight which causes Q4808 to conduct heavily and supply approximately 10 volts agc voltage to the rf attenuator (P/O module A4500).

As the homer if. signal level increases, Q4807 starts to conduct harder and causes the conduction of Q4808 to decrease. As the conduction of Q4808 decreases, agc output voltage also decreases.

Agc output voltage from the rf agc amplifier is the control voltage used to attenuate homing signals flowing through the rf attenuator circuit in module A4500.

IF. AGC AMPLIFIER


IF. AGC AMPLIFIER P/O A4800
IF. - AM SIGNAL FROM HUNT CUTOFF DETECTOR P/O A4200
Q4805
Q4806
AGC VOLTAGE TO SENSITIVITY AMP Q4810
AGC VOLTAGE TO IF. ATTENUATOR A4900
AGC VOLTAGE TO SIGNAL STRENGTH AMPLIFIER

EL1AT130

The homer if. signal from the hunt cutoff detector is applied to if. agc amplifier Q4805. With weak received signals, conduction of transistor Q4805 is slight which causes Q4806 to conduct heavily and supply approximately 10 volts agc voltage to if. attenuator A4900.

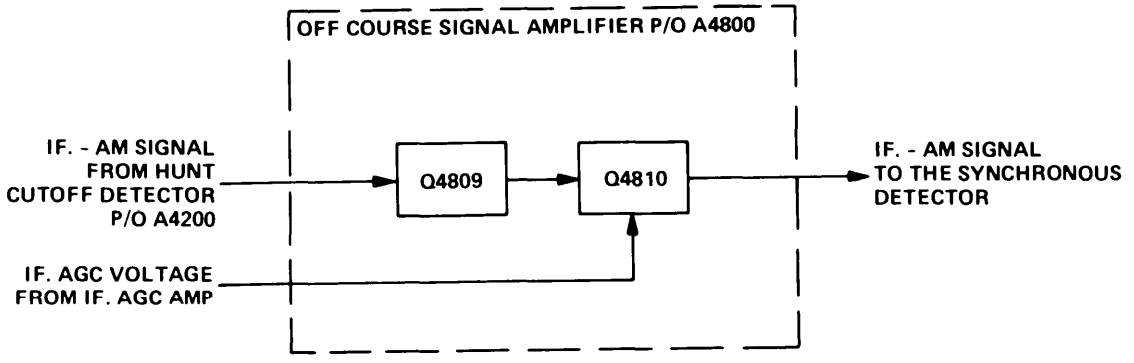
As the homer if. signal level increases, Q4805 starts to conduct harder and causes the conduction of Q4806 to decrease. As the conduction of Q4806 decreases, agc output voltage also decreases.

Agc output voltage is the control voltage used to attenuate the homing signals flowing through if. attenuator module A4900.

The agc voltage is also applied to the signal strength and sensitivity amplifiers located in module A4800.

1-53. HOMER-DETECTOR AMPLIFIER ASSEMBLY A4600. (CONT)

OFF COURSE SIGNAL AMPLIFIER

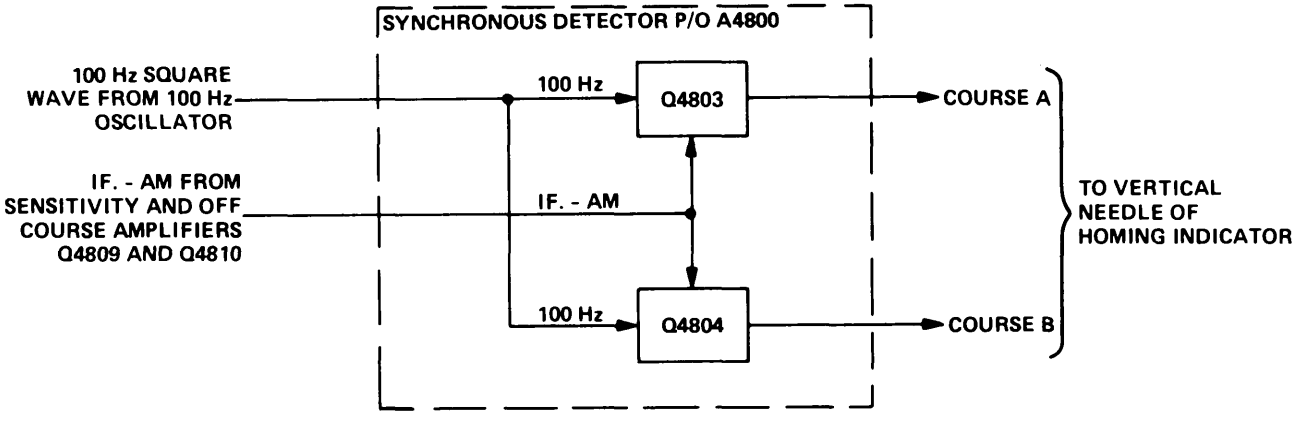

OFF COURSE SIGNAL AMPLIFIER P/O A4800
IF. - AM SIGNAL FROM HUNT CUTOFF DETECTOR P/O A4200
IF. AGC VOLTAGE FROM IF. AGC AMP
Q4809
Q4810
IF. - AM SIGNAL TO THE SYNCHRONOUS DETECTOR

EL1AT131

The homer if.-am signal, isolated by transistor Q4809, is applied to sensitivity amp Q4810. The bias level of Q4810 is established by if. agc voltage from the if. agc amp.

When the received homing signal is of a low level, if. agc voltage causes transistor Q4810 to conduct harder allowing more of the homing signal to be applied to the synchronous detector.

SYNCHRONOUS DETECTOR



EL1AT132

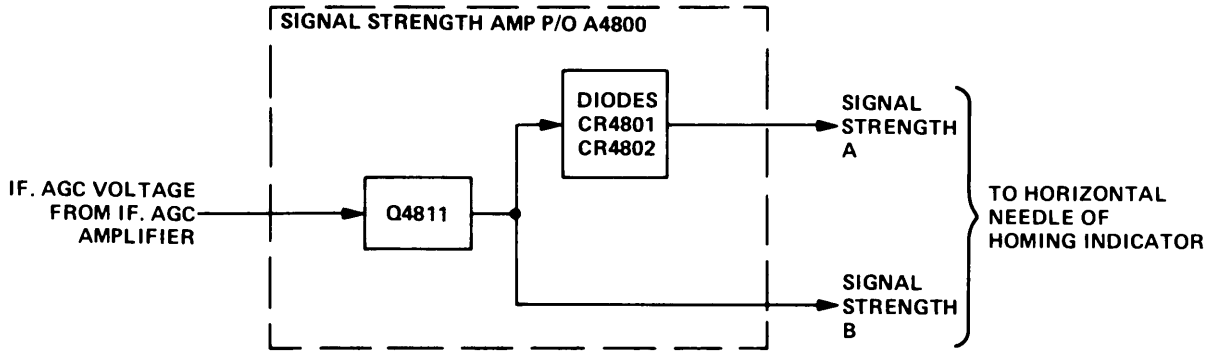
1-53. HOMER-DETECTOR AMPLIFIER ASSEMBLY A4800. (CONT)

The output if.-am signal from amplifier Q4810 is applied to transistors Q4803 and Q4804 which form the synchronous detector. The synchronous detector circuit is also driven by the 100 Hz oscillator used to alternately switch the homing signals from the left and right antennas into the circuit.

When the positive and negative half cycles of the homer if.-am signal have equal strength, the outputs of Q4803 and Q4804 are equal in amplitude and opposite in phase which causes the homing indicator vertical needle to be centered.

When there is unequal signal strength between the positive and negative half cycles, the vertical needle indicates an average output between the two signals.

The homing indicator vertical needle allows the pilot to determine if the aircraft is off course left or off course right. When the vertical needle is centered, the aircraft is perfectly alined with the transmitting station.


SIGNAL STRENGTH AMP P/O A4800
DIODES CR4801 CR4802
SIGNAL STRENGTH A
IF. AGC VOLTAGE FROM IF. AGC AMPLIFIER
Q4811
TO HORIZONTAL NEEDLE OF HOMING INDICATOR
SIGNAL STRENGTH B

EL1AT133

The signal strength amplifier controls the deflection of the homing indicator horizontal needle. With no signal input, if. agc voltage is maximum and transistor Q4811 conducts, causing the horizontal indicator deflection to be maximum.

As the level of the received signal increases, if. agc voltage decreases, which reduces conduction of Q4811 and causes less deflection of the horizontal needle. Minimum deflection of the indicator (needle centered) occurs at maximum received signal level.

1-54. RETRANSMIT OPERATION.

NOTE

This paragraph contains a discussion of retransmit operation. Not to duplicate other areas of the manual, the received and transmitted signals are not traced through the receiver-transmitter circuitry. Detailed interconnection of the radio sets and associated equipment operating in the retransmit mode is shown on FO-8.

To follow the simplified interconnection of two radio sets operating in retransmit mode, see FO-9 while reading this paragraph.

Two AN/ARC-131 Radio Sets, tuned to different frequencies, maybe interconnected and operated as an unattended two-way relay station. The first radio set receiving a signal keys the transmit circuits of the second radio set and couples the received signal into the second transmitter for retransmission.

The relay station maybe operated in either carrier squelch or tone squelch mode.

NOTE

SQUELCH disable mode (DIS) cannot be used for retransmit operation.

The radio set transmitter control circuits are interlocked by squelch relay K5502 to ensure that the two radio sets will not transmit simultaneously. FO-9 is a simplified block diagram showing the squelch relays in their deenergized condition. When the relays are deenergized, both radio sets are in receive node with no signal received.

RETRANSMIT CIRCUIT, STATIC CONDITION

The radio sets are in the static condition when no signals are being received or transmitted. Both squelch relays (K5502) are deenergized since no carrier or tone signal is present in either radio set. With these relays deenergized, retransmit control groundpaths are open and both transmitters are deactivated.

RETRANSMIT CIRCUIT, DYNAMIC CONDITION

When a signal is received by radio set no. 1, the signal Ievel in the radio set causes squelch dc amplifier Q5207 to conduct, thereby energizing squelch relay K5502.

1-54. RETRANSMIT OPERATION. (CONT)

With K5502 energized, the retransmit control ground, which originates in the receiver-transmitter during the receive condition, is applied through contacts 5 and 6 of K5502 and then through the control units to transmitter key relay K9602 in radio set no. 2.

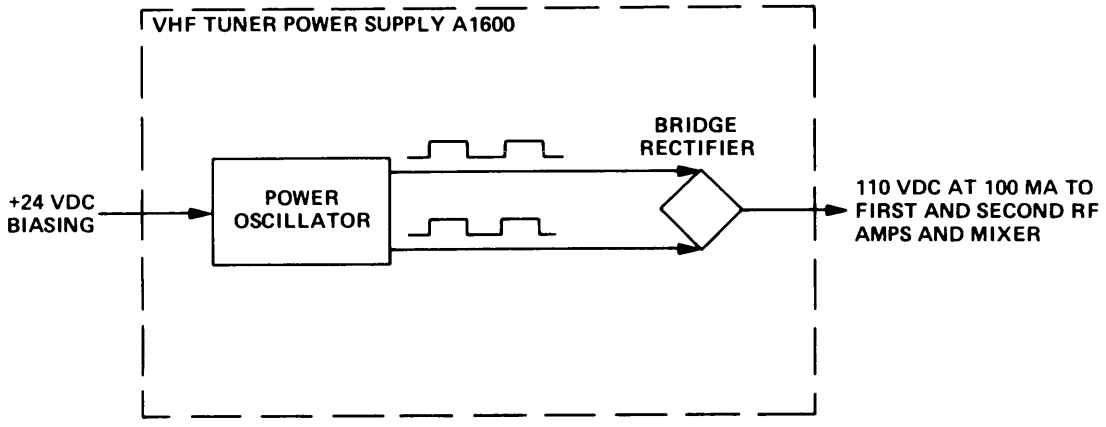
Simultaneously, the received audio signal is coupled from radio set no. 1 through the control units to the transmitter circuits of radio set no. 2 for transmission.

The retransmit control ground, placed on radio set no. 2, simultaneously keys the transmitter circuits and removes the ground applied to squelch relay K5502 when radio set no. 2 is in the receive condition.

When radio set no. 2 is in the transmit condition, the sidetone gate circuits (not shown) operate relay K5502. Breaking the groundpath applied to relay K5502 in radio set no. 2 prevents radio set no. 2 from energizing the transmit circuits of radio set no. 1. After retransmission has ceased, radio set no. 2 will return to the receive condition.

With both radio sets in the receive condition, either radio set can receive a signal and transmit it to the other radio set. The radio set that receives the signal first is tuned to the frequency being transmitted to the relay station.

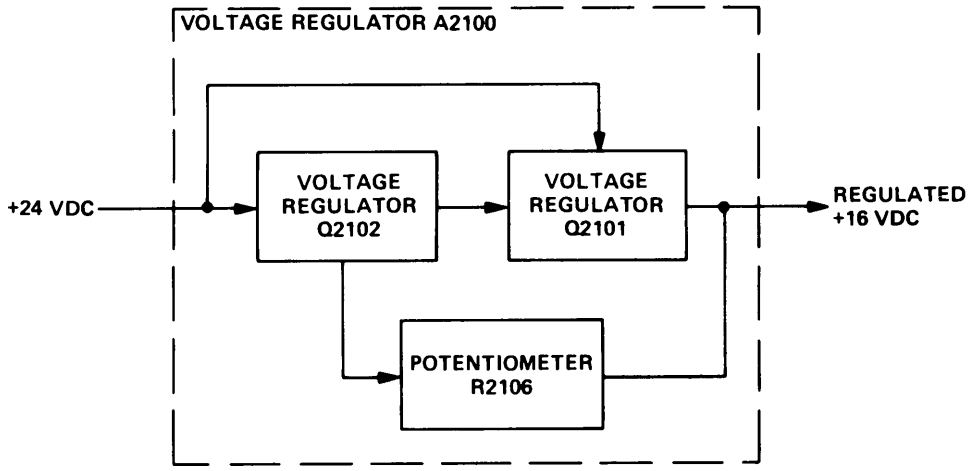
1-55. VHF TUNER POWER SUPPLY MODULE A1600.


VHF TUNER POWER SUPPLY A1600
BRIDGE RECTIFIER
+24 VDC BIASING
POWER OSCILLATOR
110 VDC AT 100 MA TO FIRST AND SECOND RF AMPS AND MIXER

EL1AT134

Vhf tuner power supply A1600 supplies biasing voltages to vacuum tubes located in modules A1200, A1300, and A1400. The power oscillator outputs a 1000 Hz square wave when +24 vdc biases the stage. The 1000 Hz square wave is rectified in the full wave bridge rectifier where an output of approximately 110 vdc at 100 mA is applied to the vhf tuner.

1-56. VOLTAGE REGULATOR ASSEMBLY A2100.



Voltage regulator assembly A2100 provides a regulated output of +16 vdc for circuits in the receiver-transmitter. The regulator maintains + 16 vdc output over a wide range of current demands.

Potentiometer R2106 adjusts biasing levels and the regulated output of +16 vdc, while +24 vdc biases voltage regulators Q2102 and Q2101.

Voltage regulator assembly A2100 includes a time delay circuit which is discussed in paragraph 1-19.

1-57. POWER SUPPLY ASSEMBLY A9500.

See FO-10 while reading this paragraph.

Power supply assembly A9500 provides +24 vdc for radio set operation and provides 400 Hz voltage for cooling fan motor operation during transmit mode. An unregulated 27.5 vdc output is also supplied by the assembly.

COOLING FAN OPERATION

The cooling fan turns on when the radio set is operated in the transmit mode. The +24 vdc from the series regulator is converted to 400 Hz by the dc-ac converter which is used to power the cooling fan.

When the push-to-talk button is pressed, a transmitter ground signal is applied to the dc-ac converter causing the stage to oscillate at 400 Hz. The 400 Hz power level is coupled through transformer T9501 to motor B9501, which causes it to turn on.

1-57. POWER SUPPLY ASSEMBLY A9500. (CONT)

REGULATOR OPERATION

The series regulators, connected in parallel, increase the current capabilities of the power supply and maintain +24 vdc at a constant level.

If the required 24 vdc level increases above 24 volts, conduction of the voltage sensors decreases, causing conduction of the regulator driver to decrease. Decreased conduction of Q9507 causes decreased conduction of the series regulators, which then decreases the required voltage level to 24 volts.

If the required 24 vdc level decreases below 24 volts, conduction of the voltage sensors and regulator driver increases. This action causes conduction of the series regulators to increase, thereby increasing the required voltage to 24 vdc. Potentiometer R9511 controls the output voltage level.

1-58. RECEIVER-TRANSMITTER INTRAUNIT CIRCUIT FUNCTIONING.

This paragraph will explain distribution of primary power, dc operating power, and the metering circuit. All are contained in the receiver-transmitter and are explained here to clarify intercircuit relationships that were not evident in the module signal flow analysis. See FO-11 while reading this paragraph.

DISTRIBUTION OF PRIMARY POWER

Unregulated +27.5 vdc primary power is supplied to the receiver-transmitter at pins 18,34, and 36 of main power connector P9601. Pin 16 of P9601 does not receive + 27.5 vdc until the radio set is switched to homing operation.

Primary power is connected through pins 1,2, and 9 of connector P9501 to activate the receiver-transmitter power supply. The power supply couples unregulated +27.5 vdc through P9501, pin 13 to the control coils of relays K9601, K9602, K9603, K9604, and K9606. Unregulated + 27.5 vdc is also fed to the receiver-audio amplifier through pin 9 of connector P5501, rf control module through P4501, pin 2, and to the gearbox assembly through pin 25 of connector P9701.

Regulated +24 vdc is coupled through P9501, pin 8 and P5501, pin 29 to receiver audio amplifier. It is also applied to vhf tuner A1000, test switch S9601, P2101 pin 4 of voltage regulator A2100, and P9701 pin 23 of gearbox assembly A9700.

Regulated +24 vdc is also applied through pin 7 of connector P9501 to the control coil of relay K9605 and to contacts 2 and 6 of relay K9601.

1-58. RECEIVER-TRANSMITTER INTRAUNIT CIRCUIT FUNCTIONING. (CONT)

In transmit operation, relay K9601 couples regulated +24 vdc through contacts 2 and 6 and contacts 1 and 5 to the rf control modules and rf amplifier. Application of +24 vdc to the rf control through connector P4501 pin 4, causes the communications antenna to be removed from the receiver input and connected to the output of band (A) and band (B) harmonic filters. Regulated +24 vdc applied to the rf amplifier activates the amplifier during transmit operation.

DISTRIBUTION OF +16 VDC

Voltage regulator assembly A2100 supplies +16 vdc to the receiver-transmitter. The voltage is supplied through connector P2101, pin 6 to P3001 pin c on crs A3000, contact 2 on if attenuator A4900, P5501 pin 7 on receiver-audio amplifier A5500, and to P4501 pin 15 on rf control module A4500. The +16 vdc is also applied to TEST SWITCH S9601 on the main chassis for metering and to rf oscillator module A2000 through connector P2001. The vhf tuner receives + 16 vdc through contact 4.

When the radio set is in receive condition, relays K9601, K9603, and K9605 are deenergized, relay K9605 applies + 16 vdc through contacts 2 and 4 to connector P4001, pin H to activate the circuits in if. amplifier assembly A4000. Relay K9605 becomes energized only when the radio set is tuning and then applies + 16 vdc through contacts 5 and 2 to connector P5501 pin 19 on receiver-audio amplifier assembly A5500. This action turns on the 800 Hz oscillator within the receiver audio amplifier. The 800 Hz tuning tone is applied to the audio line and operator's headset.

During the tuning operation, the voltage regulator assembly applies +16 vdc through connector P2101, pin 8 to P3001, pin F of crs A3000. This action disables the crs error signal and prevents it from being applied to receiver local oscillator A1500 when the radio set is tuning.

In transmit operation, relays K9601 and K9603 are energized. Relay K9603 connects +16 vdc output of voltage regulator assembly A2100 through contacts 5 and 2 to amplifier modulator A8700, oscillator-buffer A6000, isolation amplifier A6600, and vhf tuner A1000. The power oscillator circuit within the vhf tuner supplies higher level dc voltages that are used by the tuner.

During homing operation, + 27.5 vdc is applied from the control unit through pin 16 of main power connector P9601 to pin 12 of P4501 on rf control assembly A4500. The + 27.5 vdc homer operate voltage energizes relay K4502 in the rf control assembly which, in turn, applies + 16 vdc through P4501 pin 6 to homer amplifier detector assembly A4800 through pin 6 of connector P4801. This voltage activates the homer detector amplifier.

1-58. RECEIVER-TRANSMITTER INTRAUNIT CIRCUIT FUNCTIONING (CONT)

METERING CIRCUIT

See FO-12, receiver-transmitter, Radio RT-823/ARC-131, while reading this section.

Test Switch S9601 on the receiver-transmitter front panel selects various operating voltages and outputs and applies them through series resistances when necessary to TEST METER M9601. The test meter displays these voltages to provide a quick check of radio set performance. TEST SWITCH S9601 positions are marked with numbers 1 through 6.

With TEST SWITCH S9601 in position 1, +24 volts are applied to the meter. The meter requires 100 microampere for full scale deflection, therefore +24 volts applied across R9606 (470 KΩ) produces half-scale deflection.

In position 2, +16 volts are applied across R9605 (300 K Ω) where a normal reading is approximately half-scale deflection.

In position 3, a portion of agc voltage is applied to the meter through R9604. Resistor R9604 limits the meter current to provide approximately half-scale deflection for normal agc levels.

In position 4, a portion of rf forward power is applied to the meter. Normal forward power provides approximately half-scale deflection.

In position 5, a portion of rf reflected power is applied to the meter. Normal reflected power must not exceed quarter-scale deflection.

1-59. CONTROL, RADIO SET C-7088/ARC-131 FUNCTIONING.

All radio set operator controls are located on Control, Radio Set C-7088/ARC-131. The controls include the following:

Mode control switch S9105
Squelch control switch S9106
Volume control R9103
Frequency select controls S9101, S9102, S9103, S9104.

For an explanation on operation of these controls, see FO-13 while reading this paragraph.

MODE CONTROL SWITCH S9105

The mode of operation is determined by the mode control switch. The switch also controls the application of primary power to the radio set. Mode control switch S9105 is a four position rotary switch with six sections (front and rear). Operating power is applied to the receiver-transmitter when S9105 is set to any position except **OFF.**

In transmit-receive **(T/R)** position, the radio set operates in normal communication mode and automatically switches from transmit to receive condition or vice versa when the microphone push-to-talk button is pressed or released.

1-59. CONTROL, RADIO SET C-7088/ARC-131 FUNCTIONING. (CONT)

When mode control switch S9105 is set to T/R position, + 27.5 vdc from the aircraft electrical system is applied to connector J9101 pins C, D, E, through the front and rear wafers of switch S9105D, and is distributed to the receiver-transmitter through connector J9101 pins e, f, and F. The front wafer of S9105C provides a path for the audio input in receive mode. The audio input signal is applied to connector J9101 pin JJ and is fed through the front wafer of S9105C to connector J9101 pin N. The audio output at J9101 pin N is applied to the aircraft interphone amplifier through the interconnecting cable.

The receiver-transmitter automatically switches from receive mode to transmit operating mode when the push-to-talk button is pressed. Pressing the push-to-talk button causes a ground signal to be applied at connector J9101 pin q. The ground is connected through the front wafer of switch S9105A and applied to the control coil of relay K9602 in the receiver-transmitter.

The audio signal from the operator's microphone is applied at connector J9101 pin y, connected through the rear wafer of S9105C, and fed to the amplifier modulator assembly through connector J9101 pin x. The audio common, in both receive and transmit mode, is connected through the front and rear wafers of switch S9105C to the aircraft interphone amplifier.

In retransmit **(RETRAN)** position, the radio set operates as an automatic two-way relay which provides communications between two other stations which are separated from each other by more than line-of-sight range. Retransmission operation requires that two AN/ARC-131 Radio Sets or an AN/ARC-131 and another radio set having similar capabilities, be connected back-to-back.

NOTE

In retransmit operation, the **SQUELCH** control must be set to either **CARR** or **TONE** position. Retransmit operation will not function with the squelch control set to **DIS.**

When the mode control switch is set to RETRAN position, a ground signal is supplied by the squelch relay in audiofrequency amplifier assembly A5500 of the receiving radio set to the control units of the two radio sets. The ground signal is applied to connector J9101 pin Y and connected through the front wafer of **SQUELCH** switch S9106 to the rear wafer of S9105B. Switch S9105B in turn applies the ground to pin HH of connector J9101.

Through the interconnecting of the two control units, the ground at J9101 pin HH is fed to pin u of connector J9101 on the control unit of the transmitting radio set and is connected to J9101 pin v, through the front wafer of switch S9105A. This ground is used to key the transmitting radio set. By using the squelch relay of the receiving radio set, a ground is not provided to the transmitting set until a signal is received at the receiving radio set. When the transmitting set is keyed, the ground to its squelch relay is broken, and prevents lockup of both radio sets in transmit mode.

In retransmit mode, received audio signals are applied to the control unit of the receiving radio set at connector J9101 pin JJ and passed through the front wafer of switch S9105C to pins N and A of J9101. The audio at pin N is sent to the aircraft interphone amplifier and can be monitored by the operator. The audio at pin A is applied to connector J9101 pin c in the control unit of the transmitting radio set. The rear wafer of switch S9105C connects the audio for retransmission to the amplifier modulator assembly through pin x of J9101.

1-59. CONTROL, RADIO SET C-7088/ARC-131 FUNCTIONING. (CONT)

Resistor R9102 serves as a dropping resistor to establish the proper signal level for the transmit audio input. The audio common in retransmit mode is connected through the front and rear wafers of switch S9105C to the aircraft interphone amplifier.

In **HOME** position, the radio set provides an fm or cw homing facility which allows the pilot to home on a signal transmitted within a frequency range of 30.00 MHz to 75.95 MHz.

When the mode control is set to HOME position, the radio set provides the operator with a visual homing capability. Primary + 27.5 vdc power is applied the same as in the T/R mode except that + 27.5 vdc is also applied to the homer assembly to operate the homing circuits.

The homer operate voltage is coupled from contacts 9, 10, 11, and 12, of S9105D to contact 8 on the front wafer of S9105A. in the HOME mode, contact 8 is connected to contact 7. From contact 7 of S9105A front, the homer operate voltage is connected through pin DD of control unit connector J9101 and through the interconnecting wiring to the rf control assembly to operate communications homing relay K4502 and other homing circuits.

When S9106 is set to **CARR,** the radio set receiver circuits are gated on only when the received signal is of sufficient strength as determined by the setting of the squelch adjust (SQ ADJ) potentiometer on the receiver-transmitter front panel.

When S9106 is set to **TONE,** the radio set receiver circuits are gated on only when the received signal is modulated by a 150 Hz tone.

When SQUELCH switch S9106 is set to DIS, the ground at contact 7 is connected through S9106 to contact 5 and then to pin V on control unit connector J9101. The ground is then connected through interconnecting wiring and is used to energize squelch relay K5502 (not shown) in audiofrequency amplifier assembly A5500. The squelch relay will remain energized as long as S9106 is in the DIS position; therefore the receiver-audio amplifier will remain on and pass all audio signals.

When squelch switch S9106 is set to CARR, the ground is disconnected at contact 5 from contact 7, and the ground applied at pin V of connector J9101 is removed. The removal of the ground deenergizes squelch relay K5502 in the audiofrequency amplifier assembly. This action allows the receiver-squelch amplifier to take control of squelch relay K5502.

The noise, which is of significant amplitude in the absence of the received carrier signal, is used to control the receiver-squelch amplifier which, in turn, operates squelch relay K5502. When a carrier of sufficient strength is received, the noise decreases in amplitude and the receiver-squelch amplifier energizes K5502 which, in turn, unsquelches the receiver-audio amplifier and allows the audio to pass.

The squelch circuit can be disabled by pressing the SQ DIS button located on the receiver-transmitter front panel. This has the same effect as switching the SQUELCH switch on the control unit to the DIS position.

1-59. CONTROL, RADIO SET C-7088/ARC-131 FUNCTIONING. (CONT)

When SQUELCH switch S9106 is set to TONE, the ground at contact 7 is connected through contact 8 to contact 9 on the rear wafer of S9105A. This ground is applied to pin X of connector J9101 only when the mode control switch is set to T/R or RETRAN position. From pin X, the squelch tone ground is connected through the interconnecting wiring and is used to operate the tone mode relays in the audiofrequency amplifier assembly.

Tone mode relays K5503, K5504, and K5505 (not shown) perform the required switching for the squelch filter and receiver-squelch amplifier. When the received signal is modulated by a 150 Hz tone, the receiver-squelch amplifier tone rectifier circuit will unsquelch the receiver-audio amplifier.

Homer operate voltage is also applied from contact 7 of S9105A front through current limiter R9101, to pin GG of connector J9101. This voltage is used to operate the homing indicator flags. Operation of the flags depends on the ground return. This ground return is provided by the squelch relay in the audiofrequency amplifier when sufficient signal is received to cause unsquelching. The ground is connected, as in RETRAN operation, from the audiofrequency amplifier, through interconnecting wiring to pin Y of control unit connector J9101.

As in RETRAN operation, SQUELCH switch S9106 must be set to either CARR or TONE position. From J9101 pin Y, ground is connected to contacts 11 and 12 of S9106. With switch S9106 positioned to CARR or TONE, contacts 11 and 12 are connected to contact 1 which is connected to contact 9 on the rear wafer of S9105B. In HOME position, contacts 9 and 10 are connected and the ground is applied to pin FF of connector J9101 of the control unit and then to the homing indicator to operate the flags.

The homing indicator horizontal (signal strength) needle is controlled by the signal voltage from the homer assembly. The signal strength voltage is coupled from the receiver-transmitter unit to pin MM of control unit connector J9101. From pin MM, the signal strength voltage is connected to contact 6 on the rear wafer of S9105B.

In HOME mode, contact 6 connects to contact 5. From contact 5, the signal strength voltage is coupled through pin NN of J9101 to the homing indicator. The homing indicator horizontal needle negative terminal is returned to the homer assembly in the receiver-transmitter.

1-59. CONTROL, RADIO SET C-7088/ARC-131 FUNCTIONING. (CONT)

The homing indicator vertical (course) needle is controlled by the homer course voltage from the homer assembly. The homer course voltage is coupled from the receiver-transmitter to pin t of connector J9101. From pin t, the course voltage is connected through contacts 1 and 2 on the rear wafer of S9105B. From contact 1, the homer course voltage is connected through pin (s) of connector J9101 to the homing indicator vertical needle (+) input. The vertical needle (-) input is returned directly to the homer assembly in the receiver-transmitter.

SQUELCH SWITCH S9106

The radio set has three squelch modes, squelch disable **(DIS),** carrier squelch **(CARR),** or tone squelch **(TONE).** Squelch mode is selected by SQUELCH switch S9106 on the control unit. When S9106 is set to **DIS,** the radio set will receive all fm signals within its frequency band regardless of signal strength or the presence or absence of tone modulation.

VOL CONTROL R9103

VOL control R9103 is a 250 ohm potentiometer, wired in series with the received audio signal to control the audio volume.

The received audio signals from contact 1 of S9105C front are coupled through the wiper arm of R9103 to the aircraft interphone amplifier.

Resistor R9104 prevents the audio output from being reduced to zero when VOL control is turned maximum counterclockwise.

FREQUENCY SELECTOR CONTROLS S9101, S9102, S9103, and S9104

The radio set is tuned through a frequency range of 30.00 MHz to 75.95 MHz in 0.05 MHz steps.

Tens MHz selector S9101 – changes frequency of radio set in 10 MHz steps.
Units MHz selector S9102 – changes frequency in 1 MHz steps.
Tenths MHz selector S9103 – changes frequency in 0.1 MHz steps.
Hundredths MHz selector S9104 – changes frequency in 0.05 MHz steps.

The frequency selector switches in the control unit develop a frequency selection code which controls the operation of tuning circuits in gearbox assembly of the receiver-transmitter and tuning circuits of the antenna coupler. These switches are part of a five-wire, open-seeking, reentrant system that controls motors in gearbox assembly A9700.

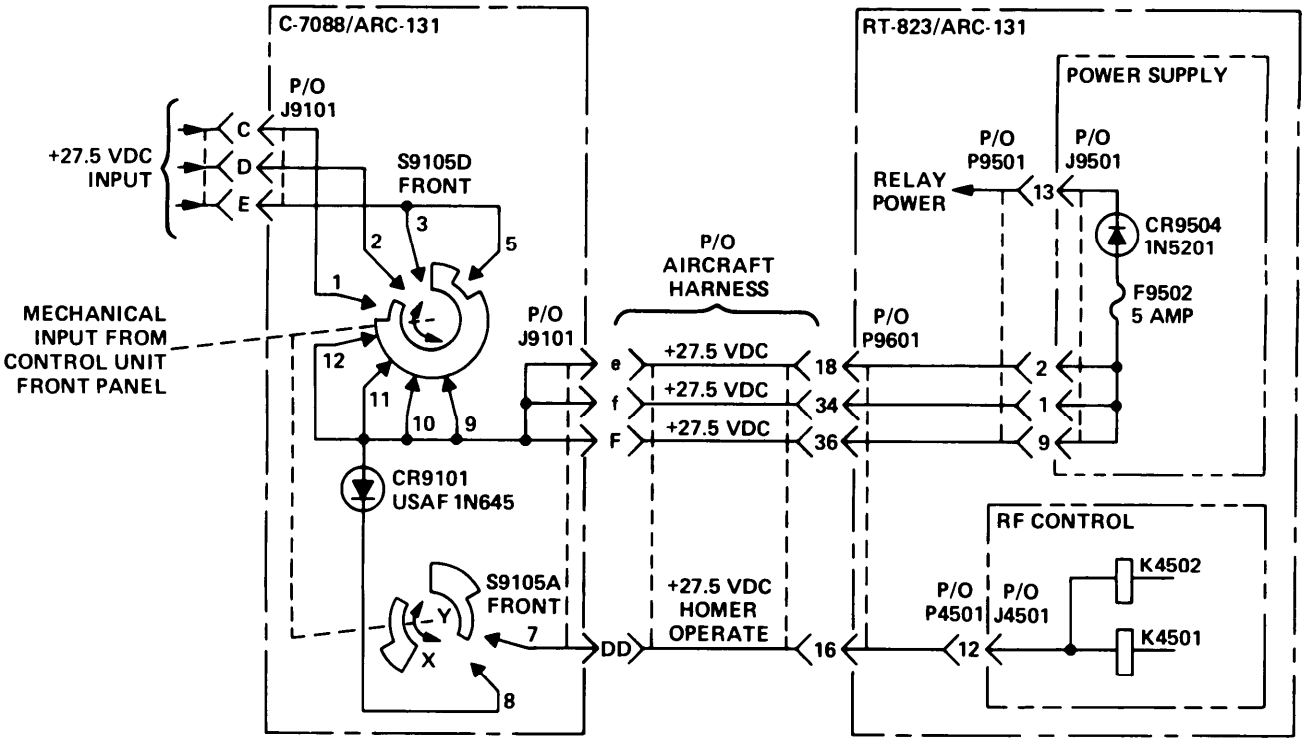
1-60. RADIO SET AN/ARC-131 INTERUNIT CIRCUIT DETAILS.

Interunit functioning is presented to provide an understanding of the interrelations of several units in various operations of the radio set. Such an understanding will help maintenance personnel, when troubleshooting, to sectionalize to a defective module or unit.

This paragraph explains interunit functioning of the following sections:

Power distribution and control circuits
Push-to-talk circuits (transmitter keying)
Audio circuits
Squelch control circuits

INTERUNIT POWER DISTRIBUTION



1-60. RADIO SET AN/ARC-131 INTERUNIT CIRCUIT DETAILS. (CONT)

The + 27.5 vdc primary power is supplied to the radio set from the aircraft electrical system. Primary power is applied at pins C, D, and E of control unit electrical connector J9101. From pins C, D, and E, power is applied to contacts 1,2,3, and 5 of wafer D of mode control S9105. Control S9105 is shown in OFF position. In this position, no power is applied through the switch. When the switch is rotated to T/R position, contacts 1, 2, and 5 are shorted to the switch segment, applying power through contacts 9, 10, 11, and 12 to pins e, f, and F of J9101.

The primary power at pins e, f, and F of the control unit receptacle is connected through the aircraft harness, to pins 18, 34, and 36 of the receiver-transmitter electrical connector P9601. From P9601, power is coupled directly to the power supply through connectors P9501 and J9501 pins 1, 2, and 9.

The power supply converts primary power into regulated +24 vdc operating voltage. In addition, +27.5 vdc primary power is coupled through fuse F9502 and diode CR9504 to operate relays on the receiver-transmitter chassis. Diode CR9504 protects the radio set from reverse voltage.

When mode control switch is rotated to RETRAN or HOME position, primary power is applied the same way, except that it is shorted through S9105 at contacts 1, 2, and 3 instead of 1, 2, and 5. In HOME position, primary power is also applied through diode CR9101. Diode CR9101 provides a reverse voltage protection for relays K4501 and K4502.

This homer primary power is coupled through the aircraft harness to pin 16 of receiver-transmitter unit electrical connector P9601. From P9601, power is applied through P4501 and J4501, pin 12 to coils of relays K4501 and K4502 on the rf control assembly.

Application of homer operate voltage energizes K4501 and K4502; relay K4501 disconnects the communications antenna from the radio set, and relay K4502 switches the power to operate the homer circuits in the homer assembly.

See paragraph 1-58 for primary power distribution within the receiver-transmitter.

TRANSMITTER KEYING CIRCUITS

See FO-14 while reading this section.

Switching operations are initiated when the transmitter system is keyed. This transfers the radio set from receive mode to transmit mode of operation. Switching operations are performed by relays in the receiver-transmitter and within the rf control and audiofrequency amplifier assemblies. FO-14 shows the radio set in transmit mode with the push-to-talk button pressed.

When the radio set is switched to transmit operation, the transmitter section is connected to the communications antenna through the rf control assembly. The sidetone gate signal output to the rf control assembly is supplied to the audio amplifier. The radio set audio section supplies all audio output signals to the aircraft interphone amplifier and is also used by the transmitting system when the system is keyed.

1-60. RADIO SET AN/ARC-131 INTERUNIT CIRCUIT DETAILS. (CONT)

In transmit operation, the control unit control switch is placed in T/R position as shown in FO-14. Input voltage, +27.5 vdc, is supplied by the aircraft electrical system and is applied to the radio set through connectors J9101 pin D, S9105 C, J9101 pin F, main connector P9801 pin 36, and connector P9501 pin 9 to the power supply.

Application of +27.5 vdc activates the power supply. Upon being activated, the power supply applies +24 vdc to the vhf tuner, gearbox, audio amplifier, voltage regulator, and relay K9605. It also supplies + 27.5 vdc to relays K9601, K9602, K9803, K9604, and K9606.

The transmit command (ground signal) from the push-to-talk button is applied through connector J9101 pin q, switch S9105A, back through connector J9101 pin v of the control unit, to main connector P9601 pin 41 and K9602 pin 3. Upon receipt of the transmit command, K9602 energizes and removes the receive mode ground from contact 8 and applies a ground through contacts 2 and 5 to the power supply. The application of the ground starts the power supply blower motor used for cooling during transmit mode.

The transmit mode ground is also applied through contacts 6 and 1 of K9602 to the rf control assembly, audio amplifier, and relays K9601 contact 3, K9603 contact 3, and K9604 contact 3. The transmit mode ground is obtained through contacts B2 and B3 of K9605. Relay K9605 energizes only when the radio set is tuning. Application of the transmit ground causes relays K9601, K9603, and K9604 to energize simultaneously.

When K9601 is energized, +24 vdc from the power supply is connected through contacts 2, 5, and 6, 1, of K9601 to activate the rf amplifier.

When K9603 is energized, + 105 vdc plate voltage for the vhf tuner is removed and contacts 1 and 6 apply a ground to the plate circuit. The voltage regulator assembly applies + 16 vdc through contacts 2 and 5 of K9603 and through connector P8701 pin 10 to turn on the amplifier modulator assembly, transmit section of the vhf tuner, oscillator and buffer amplifier, and the isolation amplifier.

When K9604 is energized, connectors P2101 pin 2 and P2101 pin 3 of the voltage regulator are tied together through contacts 5 and 2 of the relay. This action enables the squelch delay circuit by discharging C2101 through contacts 2 and 5.

The transmitter dc control voltage from the if. amplifier hunt cutoff detector is applied through contacts 1 and 6, R9601 and CR9606 to the amplifier modulator assembly. The transmitter dc control voltage is used to disable the hunt generator when the master oscillator has reached the correct frequency. In receive mode of operation, the transmitter dc control voltage is disconnected and one end of R9601 is grounded through contacts 6 and 8 of K9604, discharging C9601.

During transmit mode operation, the audiofrequency amplifier supplies a 150 Hz tone signal. The tone is applied through connector P5501 pin 1, contacts 6 and 8 of dummy relay K9606, and connector P8701 pin 8 to the amplifier modulator. The transmitter audio input from the aircraft interphone amplifier is applied to the amplifier-modulator through contacts 2 and 4 of K9606. In wide band operation, the tone signal is also interrupted by the wideband mode ground applied through diode CR9603.

1-60. RADIO SET AN/ARC-131 INTERUNIT CIRCUIT DETAILS. (CONT)

AUDIO CIRCUITS

See FO-15 while reading this section.

Audio signals from the microphone are coupled through the interphone amplifier to pins y (high) and kk (low) of control unit connector J9101. The 110 ohm and 43 ohm resistors form an impedance matching pad.

The audio signal is then coupled through mode control switch S9105. The audio high line is coupled through contacts 10 and 11 of S9105C rear and the audio common is coupled through contacts 4 and 5 of S9105C rear. The transmit audio signal is then coupled out of the control unit through pins x (high) and d (low) and through the aircraft electrical harness to the receiver-transmitter.

The signal is coupled into the receiver-transmitter electrical connector P9601 at pins 6 (high) and 5 (low). The signal is then coupled through contacts 2 and 4 of dummy relay K9606 to pins 7 (high) and 11 (low) of connector J8701 on the amplifier modulator assembly. From pins 7 and 11 of J8701, the signal is coupled to the audio mixer.

Received audio is coupled from the output of the receiver-audio amplifier, in the audiofrequency amplifier, through pins 2 (high) and 8 (low) of J5501 and P5501 to the receiver-transmitter electrical connector. The signal is coupled through pins 14 (low) and 13 (high) of P9601 to the aircraft electrical harness, which couples the signal to pins B (low) and JJ (high) of control unit electrical connector K9101. From pins B and JJ, the signal is coupled through contacts 1 and 2 (high) and 7 and 8 (low) of mode control S9105C front.

Received audio (low) is coupled direct from contact 8 of S9105C front to pin KK of control unit electrical connector J9101. Received audio (high) is coupled to pin N of J9101 through VOL control R9103. Resistor R9104 prevents the audio level from going to zero when VOL control is adjusted maximum counterclockwise. From pins KK and N of the control unit electrical connector, the received audio signal is amplified by the interphone set and then coupled to the operator's headset.

MODE CONTROL CIRCUITS

Radio Set AN/ARC-131 has three modes of operation, transmit/receive (T/R), retransmission (RETRAN), and homing (HOME). Mode control switch S9105 on the control unit selects the operating mode. The mode control switch also has an OFF position which removes primary power from the receiver-transmitter.

See FO-16 while reading the text in this section.

Transmit-Receive Mode (T/R)

When mode control switch S9105 is set to T/R, the radio set operates as a two-way fm receiver-transmitter. The radio set is placed in transmit condition by pressing the transmit button and returns to receive condition when the transmit button is released.

1-60. RADIO SET AN/ARC-131 INTERUNIT CIRCUIT DETAILS. (CONT)

In T/R mode, primary + 27.5 vdc power is applied from pins C, D, and E of control unit connector J9101 to contacts 1,2,3, and 5 of S9105D front. Primary power is connected through the switch to contacts 9, 10, 11, and 12 to pins F, e, and f of control unit connector J9101. Primary power is then coupled through the aircraft wiring, to receiver-transmitter connector P9801, where it is connected through pins 18, 34, and 36 to pins 1, 2, and 9 of connector P9501.

Primary power is applied through fuses F9502 and F9501 to the regulator circuits which provide +24 vdc necessary to operate the radio set. Power is also applied through reverse-voltage protection diode CR9504 to all receiver-transmitter relays for relay operate power.

In T/R mode, transmit audio signals originate at the microphone and are coupled through the aircraft interphone set and interconnecting cabling to pin y of control unit connector J9101. The audio is then coupled through S9105C rear from contact 11 to contact 10 and out of the control unit through pin X. The audio common is connected through the control unit from pin kk to S9105C rear contact 5, from contact 5 to contact 4, and then out pin d of the control unit connector.

Transmit audio (high) is coupled from pin X of the control unit connector to pin 6 of receiver-transmitter connector P9601. The audio common is coupled from pin d of the control unit connector to pin 5 of receiver-transmitter connector P9601. The audio signal at pins 6 (high) and 5 (low) is coupled into the amplifier modulator through relay K9606 contacts 2 and 4 and P8701 pins 7 (high) and 11 (low) to the audio mixer. The amplifier-modulator modulates the carrier with the audio signal for transmission.

Received audio is coupled from the audio output transformer in the audio frequency amplifier, through pins 2 (high) and 8 (low) of P5501, to pins 13 (high) and 14 (low) of receiver-transmitter unit connector J9601. The received audio (high) is then coupled to control unit connector J9101 pin JJ while the received audio (low) is coupled into the control unit through J9101 pin B.

Received audio (high) is connected through S9505C front from contact 1 to contact 2 then through VOL control R9103. The signal is coupled from the wiper arm of R9103 to pin N of control unit connector J9101. The received audio (low) is coupled through S9105C front from contact 7 to contact 8 and then to the audio common line at pin KK of control unit connector J9101. The received audio (high and low) is then coupled through the aircraft interphone set to the headset.

In T/R mode, the receiver-transmitter is in receive condition, except when the transmit button is pressed. When the transmit button is pressed, a ground is supplied through the aircraft interphone set to pin g of control unit connector J9101. The ground is then connected through S9105A front from contact 3 to contact 2. From contact 2, the ground is connected to pin v of control unit connector J9101 and then to pin 41 of receiver-transmitter connector P9601. From pin 41, the ground is applied to the coil of relay K9602 causing it to energize. Relay K9602, in turn, activates the transmit mode relays in the receiver-transmitter.

1-60. RADIO SET AN/ARC-131 INTERUNIT CIRCUIT DETAILS. (CONT)

Retransmit Mode (RETRAN)

In RETRAN mode, + 27.5 vdc primary power is applied through S9105D front to the receiver-transmitter as indicated in the T/R position except that contact 3 is used instead of contact 5.

Received audio signals are coupled from the receiver-transmitter into control unit connector J9101 at pins JJ (high) and B (low). The received audio (high) is connected from pin JJ through S9105C front from contact 1 to contact 3. From contact 3, the received audio (high) is connected to pin A of control unit connector J9101 then through the interconnecting cabling to radio set no. 2 for retransmission.

Received audio (low) is connected from pin B through S9105C front from contact 7 to contact 9. From contact 9, the received audio (low) is connected to pin PP of control unit connector J9101 then through interconnecting cabling to radio set no. 2. At the control unit of radio set no. 2 these signals become the retransmit audio and are coupled into the radio set at pins c (high) and w (low) of control unit connector J9101.

To complete the audio path, consider radio set no. 1 (FO-18) to be in transmit condition. Transmit audio is coupled through pins c (high) and w (low) of control unit connector J9101 to S9105C rear to contacts 12 (high) and 6 (low). Resistor R9102 reduces the signal level for proper input to the companion radio set.

Contact 12 connects to contact 10 and contact 6 connects to contact 4. From contacts 10 and 4, the audio signal is connected through pins x (high) and d (low) of control unit connector J9101 and then through interconnecting cabling to pins 6 (high) and 5 (low) of receiver-transmitter connector P9601. Audio is then coupled through relay K9606, contacts 2 and 4, to pins 7 (high) and 11 (low) 0. the amplifier-modulator for transmission.

In retransmit operation, SQUELCH control S9106 must be set to either CARR or TONE position. The retransmit control ground, originating in the audiofrequency amplifier when a received signal causes relay K5502 (not shown) to energize, is applied to the transmitter keying circuits of radio set no. 2 to energize the transmitter for retransmission. This ground is coupled from the audiofrequency amplifier through pin 5 of connector P5501. The ground is then connected through pin 10 of receiver-transmitter connector P9601, and then through the interconnecting wiring to pin Y of control unit connector J9101.

The ground is then coupled through to SQUELCH control S9106 to contact 9 of S9105B rear. Contact 9 is connected to contact 8 in RETRAN mode, therefore, the ground is coupled out of the control unit through pin HH of J9101. The retransmit control ground is coupled into radio set no. 2 control box at pin u of J9101.

Assume that FO-16 now represents radio set no. 2, and that the ground is coupled through S9105A front from contact 1 to contact 2. From contact 2, the ground is coupled out of the control unit through pin v of J9101. The ground is then connected through interconnecting wiring to pin 41 of receiver-transmitter connector P9601. From pin 41 of P9601, the ground is connected to the coil of relay K9602 causing it to energize which, in turn, activates the transmit circuits of radio set no. 2.

1-60. RADIO SET AN/ARC-131 INTERUNIT CIRCUIT DETAILS. (CONT)

Homing Mode (HOME)

In homing mode, +27.5 vdc primary power is applied as indicated in T/R mode, except that + 27.5 vdc is also supplied to the rf control to operate the homing circuits. The homer operate voltage is coupled from contacts 9, 10, 11, and 12 of S9105D front to contact 8 of S9105A front.

In HOME mode, contact 8 is connected to contact 7. From contact 7 of S9105A front, the homer operate voltage is connected through pin DD of control unit connector J9101 and through interconnecting wiring to pin 16 of receiver-transmitter connector P9601. From there, the homer operate voltage is connected to pin 12 of the rf control to operate homing relay K4502 which, in turn, activates other homing circuits.

The homer operate voltage is also applied from contact 7 of S9105A front through R9101, a current limiter, to pin GG of control unit connector J9101. This voltage is used to operate the homing indicator flags.

Operation of the flags depends on the ground return. This ground return originates in the receiver-transmitter and is connected through the audiofrequency amplifier when sufficient signal is received to cause unsquelching.

The ground is connected, as in RETRAN operation, through pin 5 of the audiofrequency amplifier connector, through pin 10 of receiver-transmitter connector P9601, pin Y of the control unit connector, and contacts 11 and 12 of S9106 to contact 1 of S9106. From contact 1 of S9106, the ground is connected to contact 9 of S9105B rear, which connects to contact 10. From contact 10 of S9105B, the ground return is connected to pin FF of control unit connector J9101 and then to the homing indicator to operate the flags.

The homing indicator horizontal needle is controlled by the signal strength voltage from the homer assembly. Signal strength voltage is coupled from the receiver-transmitter to pin MM of control unit connector J9101. From pin MM, signal-strength voltage is connected to contact 6 of S9105B rear.

In HOME mode, contact 6 connects to contact 5. From contact 5, signal strength voltage is coupled through pin NN of control unit connector J9101 to the homing indicator. The homing indicator horizontal needle negative terminal is returned to the receiver-transmitter.

The homing indicator vertical needle is controlled by the homer course voltage from the homer assembly. The homer course voltage is coupled from the receiver-transmitter to pin t of control unit connector J9101. From pint, it is connected through S9105B rear from contact 2 to contact 1.

From contact 1, homer course voltage is connected through pin s of control unit connector J9101 to the homing indicator vertical needle (+) input. The vertical needle (-) is returned directly to the receiver-transmitter.

1-60. RADIO SET AN/ARC-131 INTERUNIT CIRCUIT DETAILS. (CONT)

SQUELCH CONTROL CIRCUITS

See FO-17 while reading this section.

Squelch Disable Mode (DIS)

When SQUELCH control S9106 is set to DIS, the ground at contact 7 is connected through S9106 from contact 5 and then to pin V of control unit connector J9101. The ground is then connected through interconnecting wiring to pin 12 of receiver-transmitter connector P9601.

The ground at pin 12 (squelch disable ground) is connected to pin 25 of audiofrequency amplifier connector P5501, and then through contacts A3 and A2 of relay K5501 to the coil of relay K5502. The ground is used to energize relay K5502 which, in turn, couples +16 vdc through contacts A1 and A2 to activate the output stage of the receiver audio amplifier.

Relay K5502 remains energized and the audio stages remain activated as long as the SQUELCH control is in DIS position, and all audio signals are passed and amplified by the receiver-audio amplifier. The audio signals are then coupled through pins 2 and 8 of connector P5501 and pins 13 and 14 of receiver-transmitter connector P9601 to the control unit.

Carrier Squelch Mode (CARR)

When SQUELCH control S9106 is set to CARR, the ground at contact 7 is disconnected from contact 5, and the ground applied at pin V of control unit connector J9101 is removed. Removal of the ground at pin V causes relay K5502 in the audiofrequency amplifier to reenergize. This action removes +16 vdc coupled to the audio output stages through contacts Al and A2 of relay K5502 and turns off the receiver audio amplifier.

The noise, which is of significant amplitude in the absence of a received carrier signal, is coupled from the receiver-audio amplifier through contacts 63 and 62 of relay K5501 to ac amplifier Q5201. The noise is amplified by Q5201 and applied to dc amplifiers Q5203 and Q5204. Emitter follower Q5202 provides proper operating bias for ac amplifier Q5201. A portion of the amplified output dc amplifier Q5204 is applied to the squelch filter.

With the SQUELCH control set to CARR, relays K5503 and K5504 are deenergized and the squelch filter circuit is connected to attenuate the 7300 Hz noise components. All other frequencies are fed back to Q5202 through the squelch filter. In this condition, the amplifiers are completely degenerative for all frequencies except 7300 Hz and provide maximum gain at 7300 Hz.

The amplified noise components are coupled from dc amplifier Q5204 to noise rectifier CR5201 which provides a filtered output to dc amplifier Q5205.

When receiver noise alone is present, the rectified noise signal from CR5201 causes Q5205 to conduct. When Q5205 conducts, the collector voltage applied through contacts 63 and 62 of relay K5505 to dc amplifier Q5207 causes Q5207 to turn off. Since S5207 controls the energizing current for relay K5502, the relay is kept from energizing and +16 vdc is not applied to the output stage of the receiver-audio amplifier, and the audio signals are prevented from passing.

RADIO SET AN/ARC-131 INTERUNIT CIRCUIT DETAILS. (CONT)

SQ ADJ potentiometer R9602 allows front panel adjustment of the carrier squelch signal. Normal setting of the SQ ADJ potentiometer is at a point just above the level where noise breaks squelch. The squelch circuits can be disabled by pressing the SQ DIS switch S9602 on the receiver-transmitter. This has the same effect as switching the SQUELCH control on the control unit to DIS position.

When an incoming signal is present, the level of rectified noise component applied to dc amplifier Q5205, from noise rectifier CR5201, causes Q5205 to turn off, which in turn causes dc amplifier Q5207 to turn on. When Q5207 turns on, the emitter current applied through contacts A2 and A3 of relay K5501 energizes relay K5502 and +16 vdc is applied through contacts A1 and A2 of relay K5502 to the receiver-audio amplifier output stage. This action causes the receiver-audio amplifier to unsquelch and pass audio signals.

Tone Squelch Mode (TONE)

When SQUELCH control S9106 is set to TONE, the ground at contact 7 is connected through contact 8 and then to contact 9 on S9105A rear. From contact 9 through contact 10 of S9105A rear, the ground is connected to pin X of control unit connector J9101 (this ground is applied to pin X only when the mode control switch is set to T/R or RETRAN) and then through interconnecting wiring to pin 9 of receiver-transmitter connector P9601.

From pin 9, the ground (squelch tone ground) is connected to pin 31 of audiofrequency amplifier connector J5501. The ground is used to energize tone mode relays K5503, K5504, and K5505. Relays K5503 and K5504 connect the squelch filter circuit so that it attenuates the 150 Hz tone. All other frequencies are fed back to emitter follower Q5202 through the squelch filter. In this condition, the amplifiers are completely degenerative for all frequencies except 150 Hz and provide maximum gain at 150 Hz.

The 150 Hz tone signal is amplified as described for CARR squelch operation and is applied to tone rectifier CR5202. The filter output of CR5202 is applied to dc amplifier Q5206 and causes Q5206 to turn on. Relay K5505 is energized in TONE squelch operation and direct couples Q5206 and Q5207 through contacts B1 and B2. When Q5206 turns on, Q5207 also turns on which causes relay K5502 to energize, and apply + 16 vdc through contacts A1 and A2 to the receiver-audio amplifier output stage. This activates the audio stages and allows the audio signals to pass.

In the absence of a 150 Hz tone, Q5206 and Q5207 remain off and relay K5502 is not energized to unsquelch the receiver-audio amplifier, and audio is prevented from passing. Amplified audio signals are coupled through pins 2 and 8 of audiofrequency amplifier connector P5501, through pins 13 and 14 of receiver-transmitter unit connector P9601, and applied through interconnecting wiring to the control unit.

1-61. TUNING SYSTEM RADIO SET AN/ARC-131.

Receiver-Transmitter Radio RT-823/ARC-131 operates on any of 920 channels within range from 30 to 75.95 MHz, in 0.05 MHz increments. The operating frequency is selected at Control, Radio Set C-7088/ARC-131 and the actual tuning takes place in receiver-transmitter, Radio RT-823/ARC-131 and the antenna coupler. The control unit provides whole and decimal MHz control information to the gearbox in the receiver-transmitter.

The gearbox is a motor-driven electromechanical device which simultaneously tunes the tank circuits in the rf amplifier, oscillator buffer, vhf tuner, and inserts proper crystals in the reference and interpolation oscillators of the crs as the operator selects the frequencies at the control unit.

The gearbox consists of two autopositioner circuits and their drive motors, a differential, several gear trains, and a positioning cam. A third motor within the gearbox drives the A band and B band selection linkage. The autopositioner circuit is a motor-driven rotary positioning mechanism which provides automatic and precise selection of any one of a number of fixed positions, each of which is determined by the switch positions at the control unit. One autopositioner circuit tunes the receiver-transmitter in 1 MHz increments; the other autopositioner circuit tunes the receiver-transmitter in 0.05 MHz increments.

FREQUENCY SELECTION CODE

Frequency selector switches in the control unit develop the frequency selection code which controls tuning circuit operation in the gearbox of the receiver-transmitter and the antenna coupler tuning circuits.

The selection code for each of 920 available channels is developed by grounding specific combina tions of 19 frequency control lines. Multiwafer rotary switches S9101, S9102, S9103, and S9104 determine combinations of frequency control lines which are grounded. The frequency selection codes applied to switch S9705 in the gearbox are determined by the front and rear wafers of S9101A, S9102E, S9102H; the rear wafer of S9101 B and front wafer of S9102G.

The selection codes for determining the proper band selection in the receiver-transmitter are developed by the front wafer of S9101 B and rear wafer of S9102G. The band selection codes are connected through pins G and J of control unit connector J9101 and are applied to motor 69701 in the gearbox through either switch S9701 or S9702.

Tenths selector switch S9103 and hundredths MHz selector S9104 determine last two digits of the selected frequency. The front and rear wafers of S9103 and S9104 determine the combination of frequency control lines grounded. The grounds are applied at pins P, R, S, T, and U of control unit connector J9101 and fed through interconnecting wiring to switch S9703 to the Iedex assembly (autopositioner circuit) in the gearbox.

The Iedex assembly is mechanically connected to the crystal switch of the rf oscillator assembly. The crystal switch selects the correct combination of crystals to determine the last two digits of the selected frequency.

Tens MHz selector switch S9101 and units MHz selector S9102 also develop frequency selection codes used to tune the antenna coupler. The frequency selection codes applied to the coupler are determined by the front and rear wafers of S9101C, S9101D, S9102A, S9102B, S9102C, and S9102D.

1-61. TUNING SYSTEM RADIO SET AN/ARC-131. (CONT)

Correct ground combinations are applied to pins j, K, M, Z, and AA of control unit connector J9101. The selection code for determining proper band selection in the antenna coupler is developed by the front wafer of S9101D. The band selection code is connected through pins g and H of connector J9101. All frequency selection codes applied to the antenna coupler are used to drive the automatic positioning circuits similar to those used in the gearbox.

Table (A) on FO-18 lists the receiver-transmitter coding combinations for **tens** and units MHz selectors; table (B) lists the receiver-transmitter coding combinations for **tenths** and **hundredths** MHz selectors; and table (C) lists the antenna coupler coding combinations for tens and units MHz selectors.

WHOLE AND DECIMAL MHZ TUNING CIRCUITS

See FO-19 while reading this section.

The tuning system automatically tunes the radio set and antenna coupler to the frequency selected at the control unit. Each of the four decimal digits defining one of 920 channels between 30.00 and 75.95 MHz is independently selected at the control unit. The control converts four decimal digits into a 12 wire code consisting of grounds and opens. This information is decoded in the receiver-transmitter and is used to operate tuning motors which correctly position the induct tuner shafts of the rf amplifier, oscillator buffer, vhf tuner, and rf oscillator. The control unit also converts the two decimal digits defining one of 46 channels between 30 and 75 MHz into a seven-wire code for tuning the antenna coupler.

The 30 to 70-MHz and 0 to 9-MHz frequency selector knobs on the control unit rotate two switches, S9101 and S9102, which are electrically interconnected. When rotated through their 46 different combinations (30 to 75 MHz), 14 wire codes representing those frequencies are generated. The 14 wire codes consist of five control lines plug two band lines for the receiver-transmitter and five control lines plus two band lines for the antenna coupler. Tenths MHz and hundredths MHz frequency selector knobs rotate two switches, S9103 and S9104, which are electrically interconnected. When rotated through their 20 combinations (0.05 to 0.95), a five-wire codes, used only for the receiver-transmitter unit, is generated which represents those frequencies.

Band (A) and band (B) information is used primarily to control the band switch motor in the gearbox which drives the band switch arms on the oscillator buffer, vhf tuner, and rf amplifier. The band (B) ground signal is also used to energize relays in the rf control assembly which the switch from band (A) to band (B) antenna filters. Band (A) and (B) information is also provided to the antenna coupler.

The procedures below describe tuning system operation for the operating frequency of 30.00 MHz. The circuit operation for all remaining frequencies is identical with that for 30.00 MHz except that different tuning control signals are originated at the control unit. For simplicity, only those control lines grounded during 30.00 MHz operation are shown on the simplified diagram of FO-19.

For each receiver-transmitter and antenna coupler frequency selected, there are 19 tuning control lines used as follows:

Five control lines for receiver-transmitter first and second digits
Five control lines for receiver-transmitter third and fourth digits
Two band selection control lines for the receiver-transmitter
Five control lines for antenna coupler first and second digits
Two band selection control lines for the antenna coupler.

1-61. TUNING SYSTEM RADIO SET AN/ARC-131. (CONT)

These lines are grounded in various combinations at the control unit to provide required tuning for the particular frequency.

When the manual frequency selector switches are positioned to 30.00 MHz, as shown in FO-19, grounds are applied to tuning control lines MHz select A, MHz select E, 0.05 MHz select A, 0.05 MHz select E, and band (A) lines for the receiver-transmitter and antenna coupler.

Tuning control line select B, MHz select C, select D, and band (B) selection lines are not grounded in 30.00 MHz position. Tuning control line MHz select A receives a ground through the front wafer of S9102E and rear wafer of S9101A. The ground is applied through pin k of connector J9101, pin 26 of P9601, and pin 6 of P9701 to pin 6 on the rear wafer of S9705 in the gearbox.

If the radio set were tuned to some frequency other than 30.00 MHz, pin 6 may be making contact with the switch wiper. Pin 4 will always remain in contact with the wiper. The ground signal would then be applied through pins 6 and 4 of S9705 (rear wafer) to the emitters of Q9703 and Q9704.

Tuning control line MHz select E also receives a ground through the front wafer of S9101A in the control unit. The ground is applied to pin 5 on the front wafer of S9705 in the gearbox through connectors J9101 pin CC, P9601 pin 24, and P9701 pin 4. This ground signal is also received at pin 4 on the rear wafer of S9705 since two rotors are electrically connected. The application of the ground signal to the emitter of Q9704 causes the transistor to conduct; both transistors are necessary to ensure that S9705 will be positioned correctly for the frequency selected.

When relay K9702 energizes, either a ground or + 27.5 vdc will be connected through contacts 1 and 6 to motor B9703. The signal applied through the contacts is determined by the condition of motor reversing relay K9703. Application of + 27.5 vdc causes motor B9703 to run and in turn rotate S9705 by means of the gear train until its rotor is disconnected from pins 5 and 6 of S9705 as shown in FO-19. With an ungrounded emitter, Q9704 stops conducting, K9702 deenergizes, and + 27.5 vdc is removed from B9703.

Concurrent with grounding of the tuning control lines MHz select A and MHz select E, the tuning control lines 0.05 MHz select A and 0.05 MHz select E receive ground signals. Both control lines are grounded through the front and rear wafers of S9103A and S9104A of the control unit. The ground for 0.05 MHz select A tuning control line is applied through connectors J9101 pin P, P9601 pin 28, and P9701 pin 8 to contact 7 on switch S9703 in the gearbox. The ground received by 0.05 MHz select E tuning control line is applied through connectors J9101 pin U, P9601 pin 27, and P9701 pin 7 to contact 3 of switch S9703. Tuning control lines 0.05 MHz select B and 0.05 MHz select D are not grounded at the control unit in the 30.00 MHz position.

Considering again that the radio is tuned to some frequency other than 30.00 MHz, either contact 3 or 7 of switch S9703 will make contact with the switch rotor. The ground signal is applied through contact 8 to the emitter of Q9702.

Motor B9702 and switches S9703 and S9704 comprise the Iedex assembly. Application of the ground signal to the emitter of Q9702 causes Q9701 and Q9702 to conduct; both transistors are necessary to ensure switch S9703 will be positioned correctly for the frequency selected.

1-61. TUNING SYSTEM RADIO SET AN/ARC-131. (CONT)

Conduction of Q9702 simultaneously applies a ground signal to the control coil of K9701 and through diode CR9711. Contacts 4 and 6 of relay K9701 connects + 27.5 vdc to motor 69702 when K9701 energizes. Motor 69702 momentarily operates switch S9704 causing relay K9701 to momentarily energize and reenergize. This action causes +27.5 vdc to be applied and removed from motor 69702 in synchronism with switch S9704. Switch S9703 will step one position at a time and select the proper crystals in the rf oscillator as motor 69702 stops and starts. The ground signal applied through CR9711 energizes relay K9605.

Tuning control signals are also applied to the antenna coupler simultaneously with those to the gearbox. The antenna coupler tuning control line MHz select A receives a ground signal through the front wafer of switch S9102A and the rear wafer of switch S9101C. This signal is applied through connectors J101 pin M and J101 pin E to the antenna coupler. Tuning control line MHz select E of the antenna coupler receives a ground through the front wafer of switch S9102B and rear wafer of switch S9101 D. The ground is applied to the antenna coupler through connectors J9101 pin AA and J101 pin A.

Proper band selection is accomplished by applying a ground signal to the appropriate band control tuning line. In the case of 30.00 MHz, grounds are applied to band (A) tuning control lines for the receiver-transmitter and antenna coupler. The receiver-transmitter band (A) tuning control line receives a ground signal through the front wafer of switch S9101B. The signal is applied to one side of motor 69701 through connectors J9101 pin G, P9601 pin 23, P9701 pin 3, and switch S9701.

The application of the ground causes motor 69701 to run until the mechanical linkage that operates switches S9701 and S9702 reaches the proper position for band (A) selection. At this time, switch S9701 will open and the motor will stop. The ground signal is also applied through diode CR9701 to operate relay K9605. The antenna coupler band (A) tuning control line receives a ground through the front wafer of switch S9101D. The signal is applied through connectors J9101 pin H and J101 pin F to the antenna coupler.

GEARBOX MECHANICAL TUNING ASSEMBLY

See FO-20 while reading this section.

The gearbox train rotates four mechanical output tuning shafts to specific angular positions for each frequency selected at the control unit. Motors 69702 and 69703 drive the tuning shafts and also rotate open-seeking switches S9705 and S9703 which control 1 MHz and 0.05 MHz tuning circuits. In turn, the open-seeking switches control the operation of the dc motors.

1 MHz TUNING

Motor 69703 drives tuning shafts on vhf tuner A1000, oscillator buffer A6000, and rf amplifier A6500 circuits and positions switch S9705. Input from motor 69703 drives a geneva gear assembly through a speed-reduction gear train and slip clutch. The slip clutch acts as a safety device if the gear trains bind. The geneva gear assembly consists of a drive shaft and spur gear and a slotted drive wheel. The drive shaft spur gear is driven by a slip clutch through a speed-reduction ratio of approximately 4 to 1. The drive shaft of the geneva assembly drives the slotted wheel. Each time the drive shaft rotates 360 degrees, the slotted wheel rotates 90 degrees. The geneva assembly output is used as one input to the differential.

1-61. TUNING SYSTEM RADIO SET AN/ARC-131. (CONT)

The geneva assembly also drives open-seeking switch S9705 through a 6 to 1 speed-reducing gear train. Each time the slotted wheel on the geneva assembly is engaged and rotated 90 degrees, switch S9705 is rotated through 15 degrees which corresponds to a 1 MHz change in frequency.

Operation of the differential is based on the principle that both 1 and 0.05 MHz tuning inputs produce an output, but neither input affects the other. As the receiver-transmitter is tuned in 1 MHz increments, rotational motion of the geneva assembly is transmitted to the differential. The differential drives the vhf tuner tuning shafts, oscillator buffer, and rf amplifier. The vhf tuner tuning shaft and oscillator buffer tuning shaft are synchronized through a gear train which provides a 1 to 1 coupling ratio.

The output shafts to the vhf tuner and oscillator buffer rotate 66 degrees for each 1 MHz increment of frequency. When the receiver-transmitter is tuned across its frequency range, the vhf tuner and oscillator buffer tuning shafts rotate approximately 1,512 degrees.

0.05 MHz TUNING

Motor B9702 (part of Iedex assembly) drives 0.05 MHz Iedex switch S9703 and positions crystal selector switch S2001 in the rf oscillator. The Iedex assembly, driven by motor B9702, is coupled directly to the 0.05 MHz tuning cam which rotates 18 degrees for each 0.05 MHz increment of frequency. The 0.05 MHz tuning mechanism turns in one direction through 360 degrees in 20 steps. When the receiver-transmitter is tuned from XX.00 to XX.95 MHz, the 0.05 MHz cam rotates through 342 degrees in 19 steps. The 20th step completes 360 degrees of rotation, which returns the cam to its original position.

As the cam rotates, the cam follower transmits angular motion of the cam by means of a selector gear coupled to a spur gear through a 5 to 1 step-up ratio, to the differential. The spur gear drives the differential through a 1 to 1 ratio. As the 0.05 MHz cam rotates through 18 degrees for each 0.05 MHz increment, the differential rotates the vhf tuner, oscillator buffer, and rf amplifier tuning shafts through approximately 3 degrees. Switch S9703 is coupled directly to the shaft of motor B9702. Crystal selector switch S2001 is coupled to the shaft of the 0.05 MHz cam.

VHF TUNER MECHANICAL TUNING

The output of the gearbox differential rotates the tuning shaft of the vhf tuner spiral inductor to the position corresponding to the frequency selected at the control unit. For each 1 MHz change in frequency, the tuning shaft turns through 66 degrees. Each complete revolution (360 degrees) of the tuning shaft results in a frequency change of 5.5 MHz.

As the receiver-transmitter is tuned through its complete frequency range, the vhf tuning shaft completes approximately 4.2 revolutions of 1,512 degrees. Frequency changes of 0.05 MHz are also transmitted to the vhf tuner tuning shaft through the differential. For each 0.05 MHz increment of frequency, the tuning shaft rotates through 3 degrees.

1-61. TUNING SYSTEM RADIO SET AN/ARC-131. (CONT)

RF OSCILLATOR ASSEMBLY MECHANICAL TUNING

The shaft of the 0.05 MHz cam is mechanically coupled to the rotor of crystal selector switch S2001. The camshaft rotates the switch through 360 degrees in 20 18-degree steps. At each switch position, the rotor of switch S2001A connects 1 of 10 crystals into the collector circuit of interpolation oscillator Q2001 within the rf oscillator assembly.

Each crystal remains in the interpolation oscillator collector circuit for two positions of the switch rotor. The rotor of switch S2001B alternately connects two crystals into the collector circuit of reference oscillator Q2002 which is also part of the rf oscillator assembly. The crystals control the operating frequencies of the reference and interpolation oscillators. The switch rotor turns only in one direction. After 360 degrees rotation, the rotor is again at the original position.

OSCILLATOR BUFFER AND RF AMPLIFIER MECHANICAL TUNER

The oscillator buffer and rf amplifier tuning shafts are rotated by the output of the gearbox differential the same way as described for the vhf tuner. The rf amplifier tuning shaft is mechanically coupled to the oscillator buffer tuning shaft. Tuning of the vhf tuner, oscillator buffer, and rf amplifier is synchronized since the oscillator buffer tuning shaft is coupled off the vhf tuner tuning shaft through a 1 to 1 gear ratio in the gearbox.

CHANNEL TONE AND CRS DELAY CONTROL CIRCUITS

See FO-19 while reading the text in this section.

During tuning operations, an 800 Hz tone is supplied to the receiver-transmitter audio output circuits to indicate to the radio set operator that the tuning system is selecting a new channel. While either drive motor B9703 or B9702 is running, a ground is supplied by transistors Q9703 and Q9704 or Q9701 and Q9702 through diode CR9711 or CR9723.

This ground causes relay K9605 in the receiver-transmitter to energize. Contacts 5 and 2 of K9605 connect + 16 vdc through pin 19 of connector P5501 on the audio-frequency amplifier. Application of + 16 vdc activates the 800 Hz oscillator in the receiver-audio amplifier. The 800 Hz tone is connected through pin 2 of P5501 to the audio line where it is applied to the aircraft interphone set.

The ground used to energize relay K9605 is also sensed by diode CR9605. This ground activates time-delay circuits in the voltage regulator, which in turn energizes relay K3001 in the crs.

When relay K3001 energizes, the crs control voltage normally fed to the receiver local oscillator is momentarily grounded. This prevents the receiver local oscillator from locking on the incorrect frequency. The energizing of relay K9605 also prevents the receiver-transmitter from being keyed during the tuning cycle.

In normal transmit operation, K9605 is deenergized and supplies a ground to the receiver-transmitter transmit-receive relays through contacts 6 and 8.

CHAPTER 2

MAINTENANCE

Subject	Section	Page
Repair Parts, Special Tools, and TMDE	I	2-1
Performance Tests	II	2-2
Troubleshooting	III	2-50
Alinement and Adjustment Procedures	IV	2-126
Repair and Replacement Procedures	V	2-150

OVERVIEW

This chapter contains direct support maintenance procedures for Radio Set AN/ARC-131. Reference is made to those publications listing repair parts, tools, and TMDE. Performance testing, troubleshooting, and alinement and adjustment procedures are generally performed with the use of Maintenance Kit MK-1035/ARC-131. The description of this manual's approach to troubleshooting explains how to use the troubleshooting charts. Repair and replacement procedures cover disassembly, assembly, and replacement.

Section I REPAIR PARTS, SPECIAL TOOLS, AND TMDE

Subject	Para	Page
Repair Parts and Tools	2-1	2-1
Special Tools and TMDE	2-2	2-1

2-1. REPAIR PARTS AND TOOLS.

For repair parts and tools required for direct support maintenance, refer to TM 11-5820-670-34P.

2-2. SPECIAL TOOLS AND TM DE.

For special tools and TM DE, refer to Maintenance Allocation Chart (MAC) in TM 11-5820-670-12. For operation of Maintenance Kit MK-1035/ARC-131, refer to TM 11-6625-1610-12.

Section II PERFORMANCE TESTS

Subject	Para	Page
General	2-3	2-3
VOLTAGE DISTRIBUTION		
Test Meter Tests	2-4	2-4
RECEIVE MODE		
Audio Power Output and Distortion Test	2-5	2-6
Audiofrequency Response and Front Panel Meter Test	2-6	2-8
Receiver Sensitivity, Quieting, and Limiting Test	2-7	2-11
Maximum Signal Plus Noise-to-Noise Ratio Test	2-8	2-14
Receiver Carrier Squelch Sensitivity Test	2-9	2-16
Receiver Tone Squelch Sensitivity Test	2-10	2-19
TRANSMIT MODE		
Transmitter Power Output Test	2-11	2-22
Transmitter Tone Modulation Test	2-12	2-24
Transmitter Deviation Narrow Band Test	2-13	2-26
Transmitter Distortion Narrow Band Test	2-14	2-28
Transmitter Signal Plus Noise-to-Noise Ratio Test	2-15	2-30
Transmitter Frequency Stability Test	2-16	2-32
Transmitter Automatic Frequency Selection and Channel Changing Tone Test	2-17	2-34
Transmitter Sidetone Test	2-18	2-35
HOMING MODE		
Homing Sensitivity Test	2-19	2-38
CONTROL, RADIO SET C-7088/ARC-131		
Mode Switch Selection and Front Panel Illumination Test	2-20	2-41
Squelch Switch and Frequency Selection Test	2-21	2-43
Retransmit Receive Test	2-22	2-46
Retransmit Transmit Test	2-23	2-48

2-3. GENERAL.

This section contains performance test procedures for use with Maintenance Kit MK-1035/ARC-131 and discrete test equipment (TMDE). They will enable you to determine whether or not an rt is operating acceptably. Each test procedure checks specific functions of the receiver-transmitter to help you find and isolate faults.

Each test is complete and maybe performed individually. Therefore, you may choose an appropriate test to verify a known gross equipment failure or performance degradation of specific stages. However, this maintenance approach is not recommended. It is best to perform all the tests in sequence. This systematic maintenance approach will ensure that all faults are found and corrected.

Faults in the rt are evidenced by failure of the unit to meet the performance standards found within the test procedures in bold type. When an rt fails to meet a performance standard, discontinue the test and turn to the troubleshooting chart referred to in the procedure.

2-4. TEST METER TESTS.

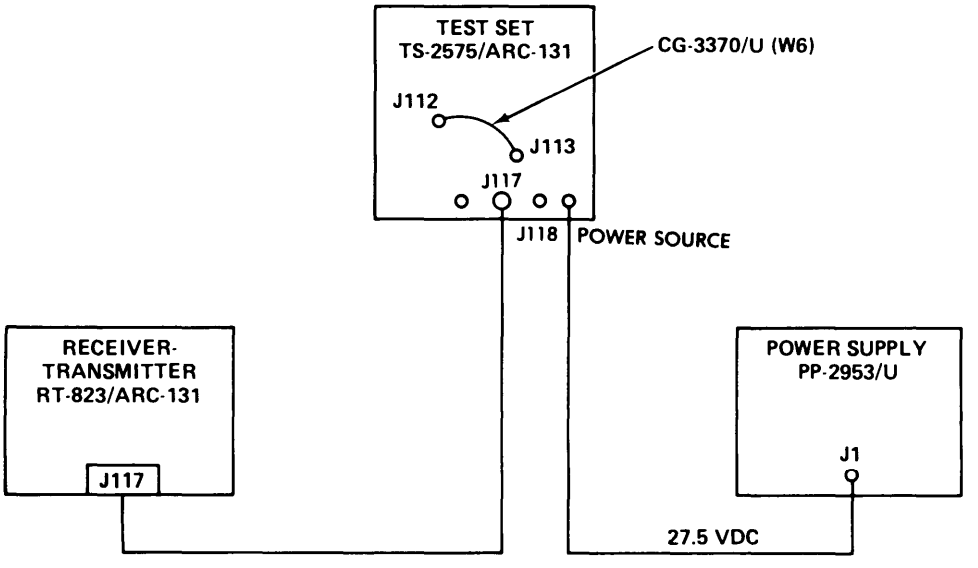
PURPOSE

The test meter tests provide an overall performance check of the radio set. Test switch S9801 selects various operating voltages in the receiver-transmitter and applies them to test meter M9601.

TEST EQUIPMENT AND MATERIALS

Power Supply PP-2953/U
Maintenance Kit MK-1035/ARC-131
All cables ore part of MK-1035/ARC
TEST SETUP

Connect equipment as shown in test setup diagram. Turn on all equipment and allow at least 5 minutes for warmup.



EL1AT140

INITIAL EQUIPMENT CONTROL SETTINGS

Set equipment controls as indicated in the following table.

CONTROL AND SWITCH SETTINGS

EQUIPMENT	CONTROL OR SWITCH	POSITION/SETTING
RT-8231ARC-131	TEST SWITCH	Set as instructed in procedures.
	XMTR HI-LO	HI

2-4. TEST METER TESTS. (CONT)

EQUIPMENT	CONTROL OR SWITCH	POSITION/SETTING
TS-25751ARC-131	FREQ sel	30 MHz
	SQUELCH	DIS
	MODE SWITCH	TIR
	TRANSMIT SWITCH	ON
	WIDEBAND-NAR BAND	NAR BAND
	ON-AGC	ON
	HI-LO	HI
	+28 VDC	ON

TEST PROCEDURE

1. On the RT-823/ARC-131, successively set TEST SWITCH for each position (1 through 6) and observe indication on TEST METER. See the following table.

PERFORMANCE STANDARD

TEST SWITCH POSITION	TEST METER INDICATION	IF OUT OF TOLERANCE, SEE TROUBLESHOOTING CHART
1	50 ± 30	2-1 (page 2-56)
2	50 ± 30	2-1, sheet 4 (page 2-59)
3	not less than 70	2-6 (Page 2-80)
4	50 ± 20	2-13 (page 2-91)
5	not more than 10	2-1 (page 2-56)
6	0	2-1 (Page 2-56)

2. Set TRANSMIT switch on TS-2575/ARC-131 to OFF position.
3. Disconnect cable CG-3370/U (W6) from input J1 13 and turn TEST SWITCH of RT-823/ARC-131 to position 5.

STANDARD. TEST METER should indicate not more than 30.

4. Momentarily press XMTR TEST switch on RT-823/ARC-131.
5. Turn TEST SWITCH to position 6.

STANDARD. TEST METER should indicate zero.

2-5. AUDIO POWER OUTPUT AND DISTORTION TEST.

PURPOSE

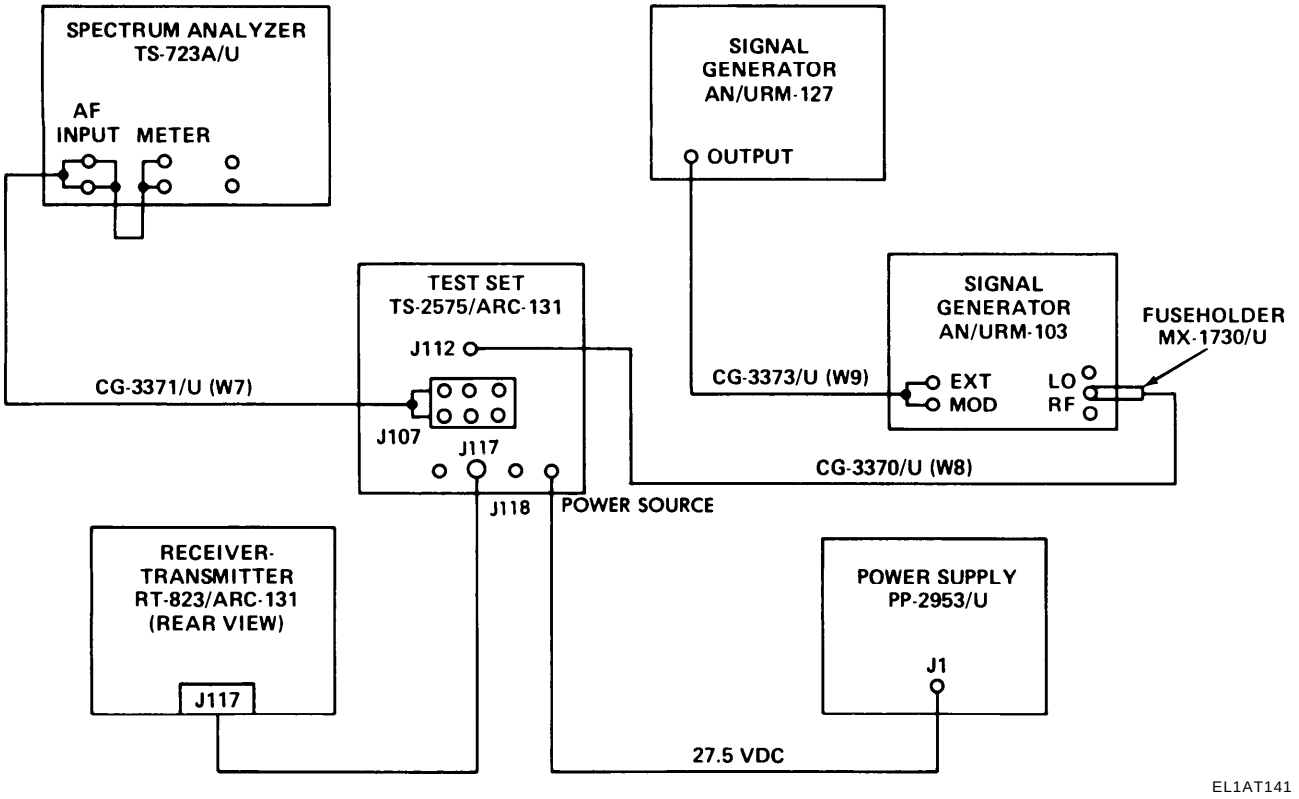
This test checks the receiver section of the radio set. Two signal generators simulate a frequency modulated signal. The rt demodulates the signal and outputs audio power containing a percentage of distortion, which is measured by a spectrum analyzer.

TEST EQUIPMENT AND MATERIALS

Maintenance Kit MK-1035/ARC-131
Signal Generator AN/URM-103
Signal Generator AN/URM-127
Spectrum Analyzer TS-723A/U
Power Supply PP-2953/U
Fuseholder MX-1730/U
All cables are part of MK-1035/ARC

TEST SETUP

Connect equipment as shown in test setup diagram. Place the +28 VDC ON-OFF switch on TS-2575/ARC-131 to ON and allow all equipment 5 minutes for warmup.



2-5. AUDIO POWER OUTPUT AND DISTORTION TEST. (CONT)

INITIAL EQUIPMENT CONTROL SETTINGS

Set equipment controls as indicated in the following table.

CONTROL AND SWITCH SETTINGS

EQUIPMENT	CONTROL OR SWITCH	POSITION/SETTING
TS-25751ARC-131	MODE SWITCH	T/R
	VOL	Maximum (clockwise)
	SQUELCH	DIS
	FREQ sel	60.05 MHz
AN/URM-127	Freq dial	10
	FREQ RANGE MULTIPLIER	X 100
	OUTPUT CONTROL	As required in test procedures.
TS-723A/U	FUNCTION switch	METER
	AF-RF switch	AF
	Meter RANGE	10
	Freq RANGE	X 10
	Coarse FREQUENCY	100
AN/URM-103	BAND SWITCH and RF TUNING CONTROL	Adjust to 60.05 MHz.
	FUNCTION switch	EXT MOD
	RF OUTPUT switch	LO 0-10 KUV
	LO-HI RF SET to LINE control and LO RF UV	Adjust for 10 microvolt output.
	DEVIATION RANGE KHZ switch	10
	DEVIATION control	Midrange position

NOTE

With mode switch in T/R position, external power is applied to the receiver-transmitter. The receiver-transmitter requires a 1-minute warmup before measurements are made.

TEST PROCEDURE

1. Set FUNCTION switch on signal generator AN/URM-103 to EXT MOD and adjust frequency for a 60.05 MHz, 10 microvolt output.
2. Adjust AN/URM-127 for 8 kHz deviation as indicated on AN/URM-103 DEVIATION KHZ meter.
3. Determine that RECEIVER AUDIO OUTPUT J107 HI-LO are connected to METER terminals of spectrum analyzer TS-723A/U.

2-5. AUDIO POWER OUTPUT AND DISTORTION TEST. (CONT)

4. Tune signal generator AN/URM-103 to 60.05 MHz as indicated by maximum indication on TS-723/U meter.

STANDARD. 2.17 to 3.45 vrms (5 mw ± 2 db)

5. If TS-723A/U meter does not indicate between specified limits, see troubleshooting chart 2-6.
6. Disconnect jumper between AF INPUT and METER terminals on TS-723A/U. Read audio distortion in percentage.

NOTE

Tune the AN/URM-103 slightly for minimum distortion as indicated on the TS-723A/U.

STANDARD. Maximum 8 percent

7. If indication on TS-723A/U meter reads above 8 percent, see troubleshooting chart 2-7.

2-6. AUDIOFREQUENCY RESPONSE AND FRONT PANEL METER TEST.

PURPOSE

This test checks the frequency response of the radio set in the 300 Hz to 10 kHz range. The flatness of the band in this frequency range should be within 2 db.

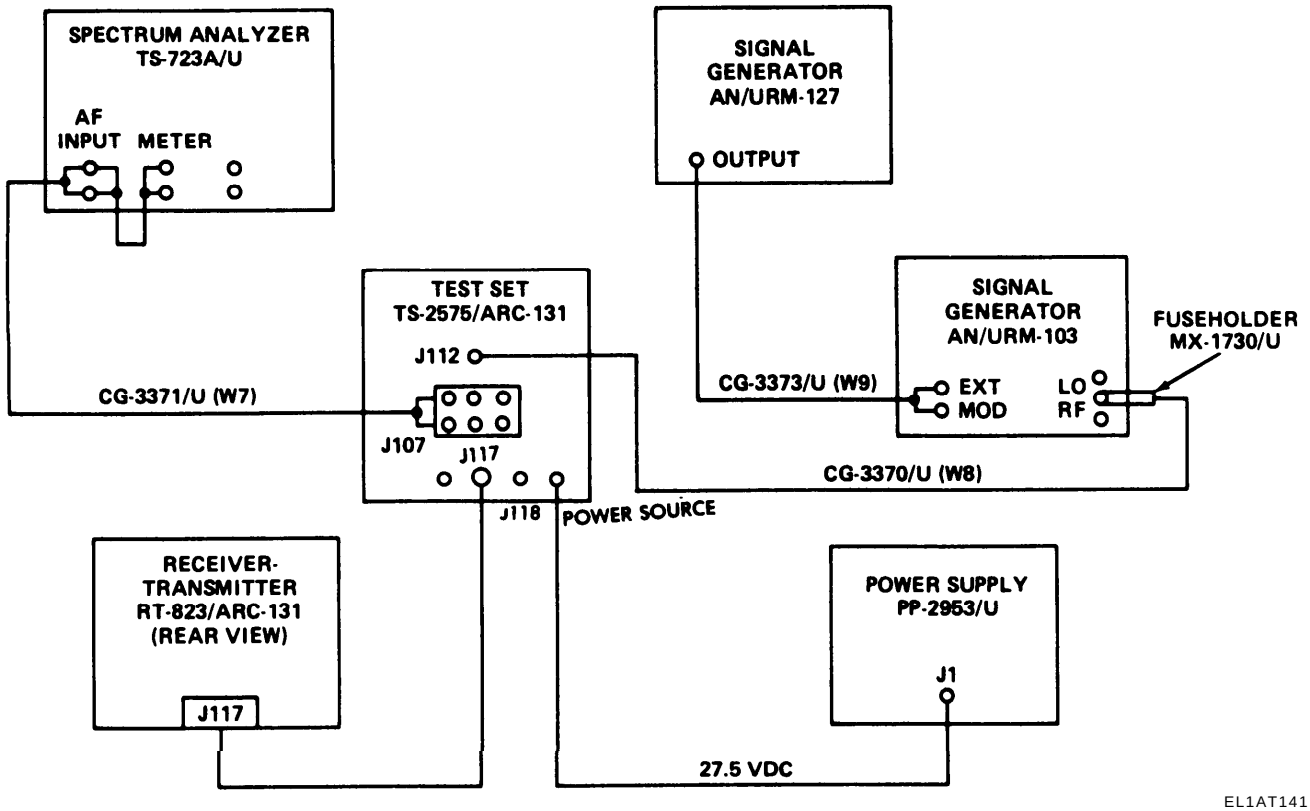
TEST EQUIPMENT AND MATERIALS

Maintenance Kit MK-1035/ARC-131
Signal Generator AN/URM-103
Signal Generator AN/URM-127
Spectrum Analyzer TS-723A/U
Fuseholder MX-1730/U
Power Supply PP-2953/U
All cables are part of MK-1035/ARC

TEST SETUP

Connect equipment as shown in test setup diagram. Turn on all test equipment and allow at least 5 minutes for warmup.

2-6. AUDIOFREQUENCY RESPONSE AND FRONT PANEL METER TEST. (CONT)



INITIAL EQUIPMENT CONTROL SETTINGS

Set equipment controls as indicated in the following table.

CONTROL AND SWITCH SETTINGS

EQUIPMENT	CONTROL OR SWITCH	POSITION/SEITING
TS-2575/ARC-131	MODE SWITCH VOL SQUELCH FREQ sel	T/R Maximum (clockwise) DIS 60.05 MHz
AN/URM-103	BAND SWITCH and RF TUNING CONTROL FUNCTION switch RF OUTPUT switch	Adjust to 60.05 MHz. EXT MOD LO 0-10 KUV

2-6. AUDIOFREQUENCY RESPONSE AND FRONT PANEL METER TEST. (CONT)

CONTROL AND SWITCH SETTINGS (CONT)

EQUIPMENT	CONTROL OR SWITCH	POSITION/SETTING
	LO-HI RF SET to LINE CONTROL and LO RF UV	Adjust for 10 microvolt.
	DEVIATION RANGE KHZ switch	10
	DEVIATION control	Midrange position
AN/URM-127	Freq dial	10
	FREQ RANGE MULTIPLIER	X 1K
	OUTPUT CONTROL	Adjust as indicated in test procedure.
TS-723A/U		Adjust as indicated in test procedure.

TEST PROCEDURE

1. Determine that RECEIVER AUDIO OUTPUTS J107 HI-LO on test set is connected to AF INPUT terminals of TS-723A/U.
2. Set TS-723A/U function switch to SET LEVEL position and adjust input sensitivity control to provide a 0 db reference.
3. Change output frequency of AN/URM-127 to 500 Hz, and adjust output for 8 kHz deviation as indicated on AN/URM-103 modulation meter.
4. Observe audio output change in db from the 1000 Hz reference (step 2).

STANDARD. ± 2 db

5. If audio output change is not within ± 2 db, see troubleshooting chart 2-8.
6. Repeat procedures 2,3, and 4 using audiofrequencies of 2000, 3000, 300, 5000, and 10,000 Hz.

STANDARD. ± 2 db

7. If audio output change is not within ± 2 db, see troubleshooting chart 2-8.
8. Disconnect cable CG-3371/U (W7) from NORMAL J107 and reconnect to WIDEBAND J108 on test set.
9. Repeat procedures 2 through 5.

2-6. AUDIOFREQUENCY RESPONSE AND FRONT PANEL METER TEST. (CONT)

10. Observe audio output change in db from the 1000 Hz reference (step 2).

STANDARD. + 2 db -3 db

11. If audio output change is not within + 2 db to -3 db, see troubleshooting chart 2-8.
12. Disconnect cable CG-3371/U (W7) from WIDEBAND J108 and reconnect to NORMAL J107 on test set.
13. Repeat steps 1 and 2.
14. Rotate TEST switch on front panel of RT-823/ARC-131 and verify the following TEST METER indications.

PERFORMANCE STANDARD

TEST SWITCH POSITION	TEST METER INDICATION
1	50 ± 20
2	50 ± 20
3	not less than 70
4	0
5	0
6	0

2-7. RECEIVER SENSITIVITY, QUIETING, AND LIMITING TEST.

PURPOSE

This test checks the ability of the rt to detect low level rf signals at several frequencies. Low level rf contains noise and distortion which make hearing the audio signal difficult.

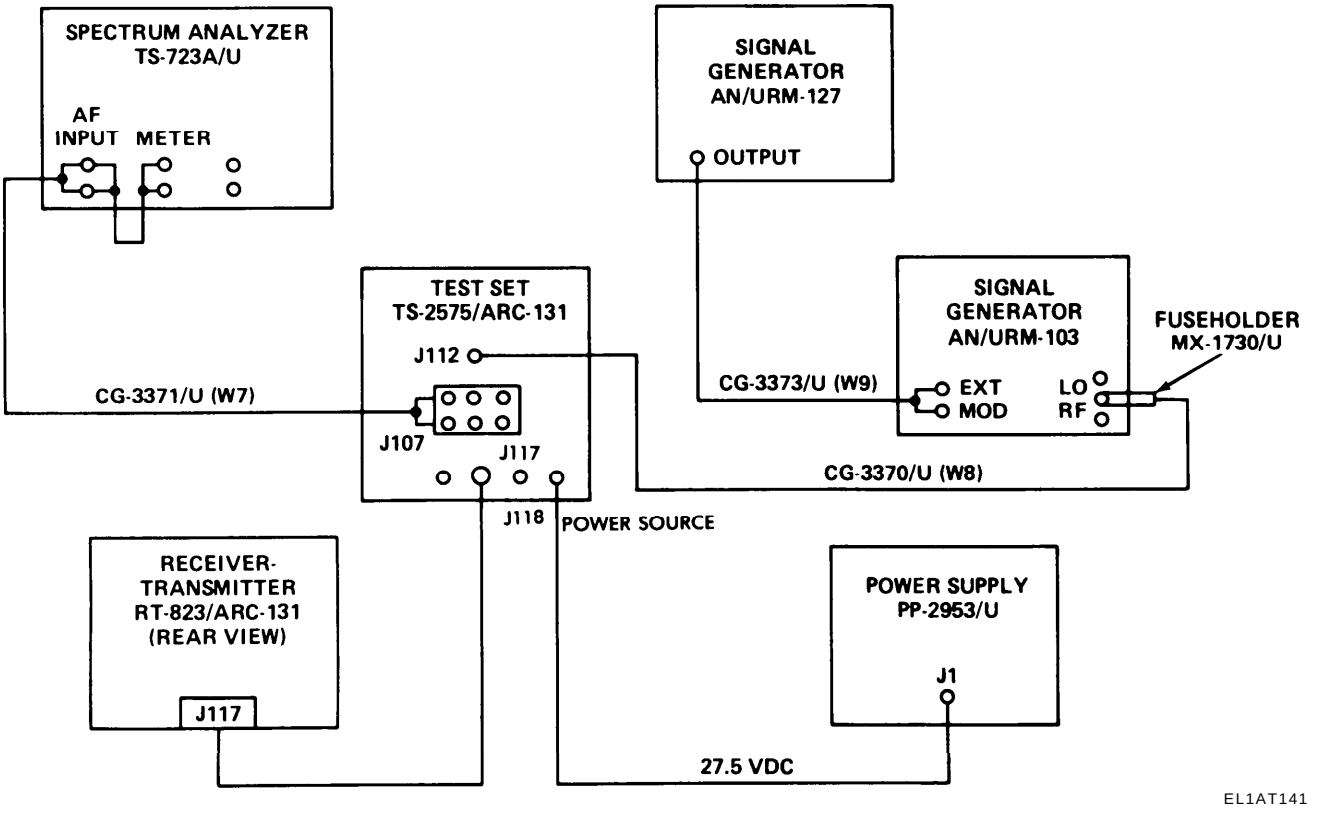
TEST EQUIPMENT AND MATERIALS

Maintenance Kit MK-1035/ARC-131
Signal Generator AN/URM-103
Signal Generator AN/URM-127
Spectrum Analyzer TS-723A/U
Fuseholder MX-1730/U
Power Supply PP-2953/U
All cables are part of MK-1035/ARC

2-7. RECEIVER SENSITIVITY, QUIETING, AND LIMITING TEST. (CONT)

TEST SETUP

Connect equipment as shown in test setup diagram. Turn on all test equipment and allow at least 5 minutes for warmup.



INITIAL EQUIPMENT CONTROL SETTINGS.

Set equipment controls as indicated in the following table.

CONTROL AND SWITCH SETTINGS

EQUIPMENT	CONTROL OR SWITCH	POSITION/SETTING
TS-2575/ARC-131	MODE SWITCH VOL SQUELCH FREQ sel	T/R Maximum (clockwise) DIS 30.00 MHz

2-7. RECEIVER SENSITIVITY, QUIETING, AND LIMITING TEST. (CONT)

EQUIPMENT	CONTROL OR SWITCH	POSITION/SETTING
AN/URM-103	BAND SWITCH and RF TUNING CONTROL	Adjust as required in test procedures.
	FUNCTION switch	EXT MOD
	RF OUTPUT switch	LO 0-10 KUV
	LO-HI RF SET to LINE control and LO RF UV	Adjust for 10 microvolt.
	DEVIATION RANGE KHZ switch	10
	DEVIATION control	Midrange position
TS-723 A/U	FUNCTION switch	SET LEVEL
	Meter RANGE	+20 db
	AF-RF switch	AF
	RANGE	X 10
AN/URM-127	Freq dial	10
	FREQ RANGE MULTIPLIER	X 100
	OUTPUT CONTROL	Adjust as required to produce 8 kHz deviation on AN/URM-103.

TEST PROCEDURE

1. Adjust AN/URM-103 signal generator output to 30.00 MHz (indicated by maximum audio on TS-723A/U meter) 0.5 microvolt, 8 kHz deviation.
2. Adjust the signal INPUT control on TS-723A/U for a 0 db reference indicated on meter.
3. Set TS-723A/U function switch to DISTORTION position and adjust coarse and fine FREQUENCY controls along with BALANCE control for a minimum meter indication.
4. Observe TS-723A/U meter indication in db. Compare the indication in db below the reference set in step 2.

STANDARD. 10 db minimum

5. If meter indication is not at least 10 db below the reference, see troubleshooting chart 2-9.
6. Repeat steps 1 through 5, adjusting TS-2575/ARC-131 test set for each of the following frequencies: 41.00 MHz, 52.00 MHz, 53.00 MHz, 65.00 MHz, and 75.95 MHz.

2-8. MAXIMUM SIGNAL PLUS NOISE-TO-NOISE RATIO TEST.

PURPOSE

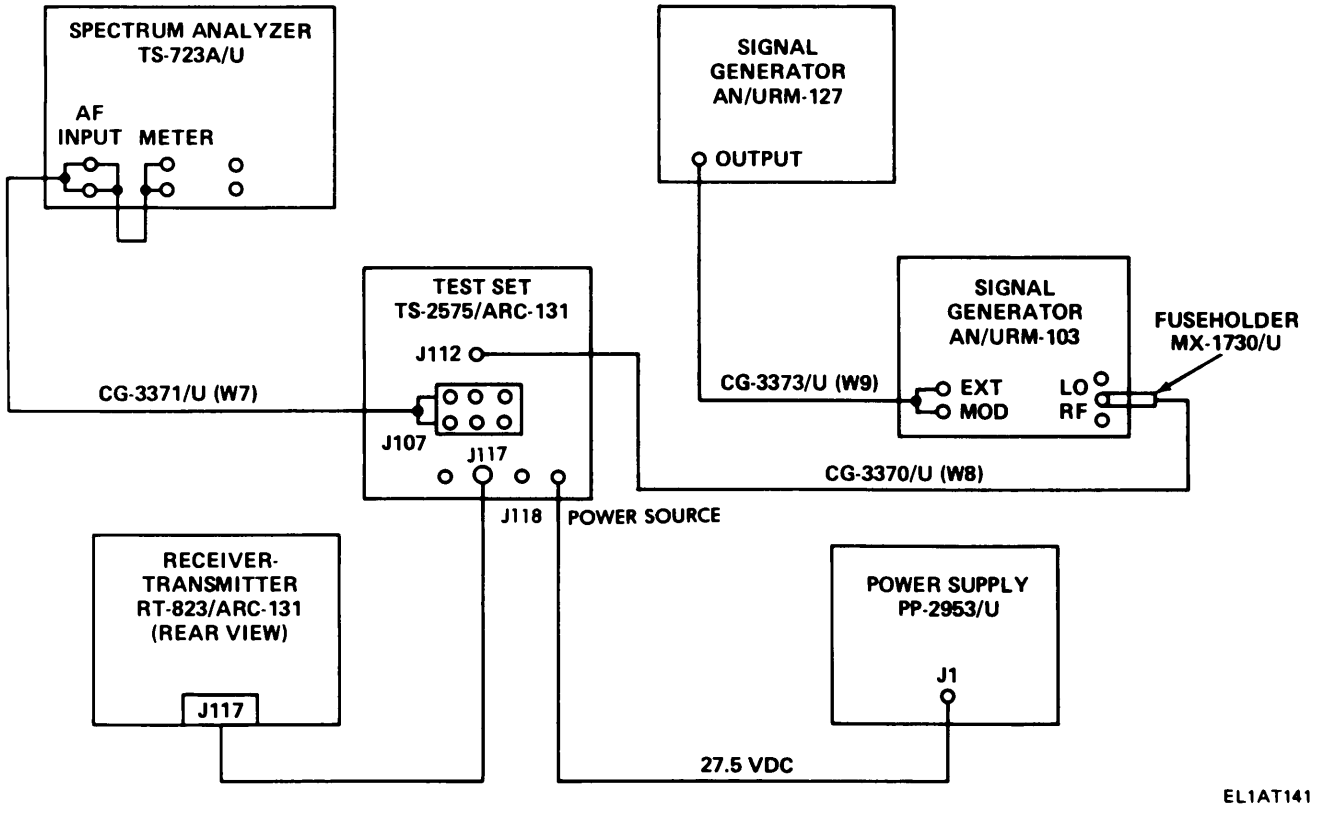
This test checks the ratio of received audio signal power and noise power when rt is in receive mode.

TEST EQUIPMENT AND MATERIALS

Maintenance Kit MK-1035/ARC-131
Signal Generator AN/URM-103
Signal Generator AN/URM-127
Spectrum Analyzer TS-723A/U
Fuseholder MX-1730/U
Power Supply PP-2953/U
All cables are part of MK-1035/ARC

TEST SETUP

Connect equipment as shown in test setup diagram. Turn on all equipment and allow at least 5 minutes for warmup.



2-8. MAXIMUM SIGNAL PLUS NOISE-TO-NOISE RATIO TEST. (CONT)

INITIAL EQUIPMENT CONTROL SETTINGS

Set equipment controls as indicated in the following table.

CONTROL AND SWITCH SETTINGS

EQUIPMENT	CONTROL OR SWITCH	POSITION/SETTING
TS-2575/ARC-131	MODE SWITCH	T/R
	VOL	Maximum (clockwise)
	SQUELCH	DIS
	FREQ set	30.00 MHz
TS-723A/U	FUNCTION switch	SET LEVEL
	Meter RANGE	+20
	AF-RF switch	AF
	RANGE	X 10
AN/URM-103	BAND SWITCH and RF TUNING CONTROL	Adjust to 30 MHz.
	FUNCTION switch	LO 0-10 KUV
	LO-HI RF SET to LINE control and LO RF UV	Adjust for 100 microvolt.
	DEVIATION RANGE KHZ switch	10
	DEVIATION control	Midrange position
AN/URM-127	Freq dial	10
	FREQ RANGE MULTIPLIER	X 100
	OUTPUT CONTROL	As required to produce 8 kHz deviation on AN/URM-103.

TEST PROCEDURE

1. Adjust AN/URM-127 output level for 8 kHz deviation as indicated on AN/URM-103 modulation meter.
2. Adjust AN/URM-103 output for a 30.00 MHz, 200 microvolt signal.
3. Adjust input sensitivity control on TS-723A/U Spectrum Analyzer for a 0 db reference in meter.
4. Remove modulation from AN/URM-103 by disconnecting AN/URM-127 output.
5. Observe TS-723A/U indication in db below reference level established in step 3.

STANDARD. 45 db minimum

6. If spectrum analyzer does not indicate a minimum of 45 db, see troubleshooting chart 2-10.
7. Repeat steps 1 through 6, adjusting TS-2575/ARC-131 for each of the following frequencies: 41.00 MHz, 52.00 MHz, 53.00 MHz, 65.00 MHz, and 75.95 MHz.

2-9. RECEIVER CARRIER SQUELCH SENSITIVITY TEST.

PURPOSE

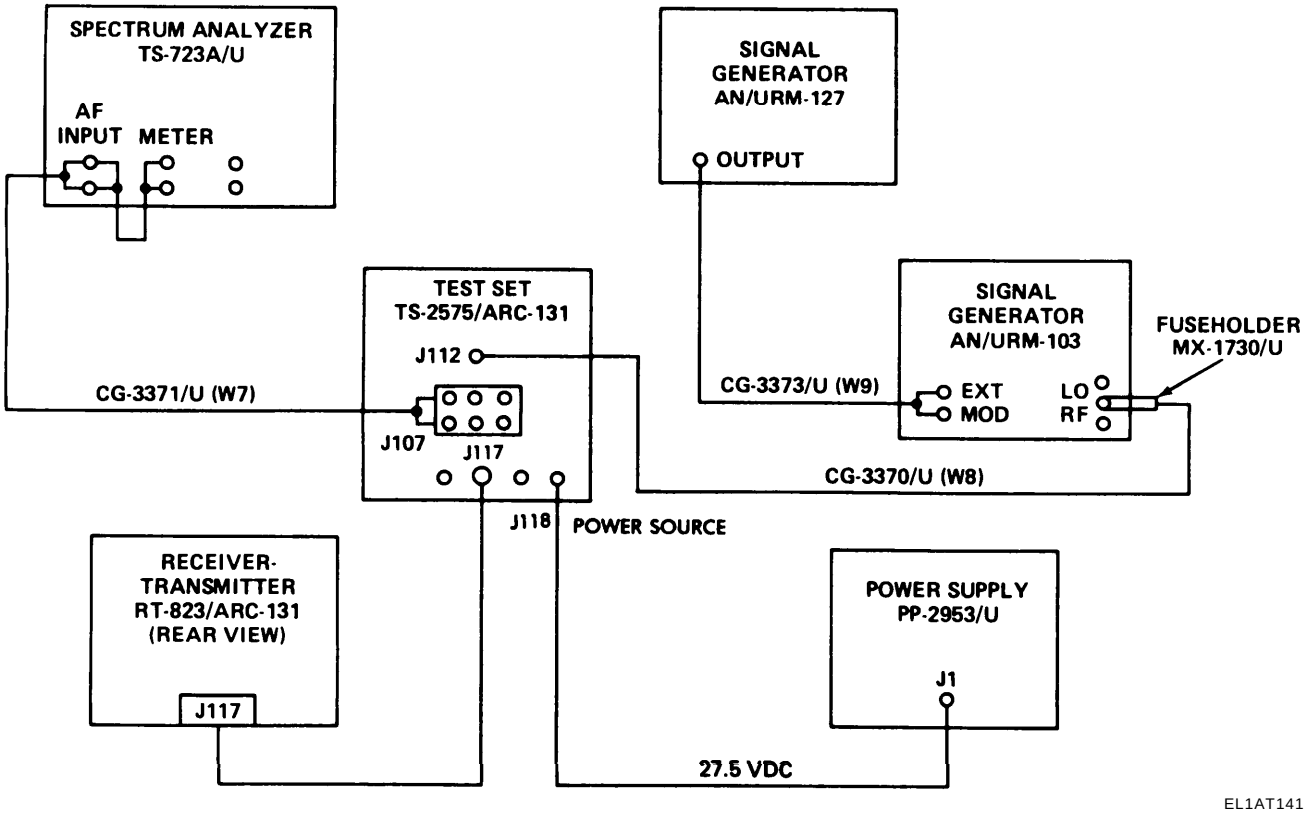
This test checks the squelch capability when carrier squelch is selected on the control unit. Squelching and unsquelching in the CARR mode occur at specified voltage levels.

TEST EQUIPMENT AND MATERIALS

Maintenance Kit MK-1035/ARC-131
Signal Generator AN/URM-103
Signal Generator AN/URM-127
Spectrum Analyzer TS-723A/U

Power Supply PP-2953/U
All cables are part of MK-1035/ARC

Connect equipment as shown in test setup diagram. Turn on all equipment and allow at least 5 minutes for warmup.



2.9. RECEIVER CARRIER SQUELCH SENSITIVITY TEST. (CONT)

INITIAL EQUIPMENT CONTROL SETTINGS

Set equipment controls as indicated in the following table.

CONTROL AND SWITCH SETTINGS

EQUIPMENT	CONTROL OR SWITCH	POSITION/SETTING
TS-2575/ARC-131	MODE SWITCH	T/R
	VOL	Maximum (clockwise)
	SQUELCH	CARR
	FREQ sel	30.00 MHz
TS-723A/U	FUNCTION switch	METER
	RANGE	X 10
	AF-RF switch	AF
AN/URM-103	BAND SWITCH and RF TUNING CONTROL	Adjust to 30.00 MHz.
	FUNCTION switch	EXT MOD
	RF OUTPUT switch	LO 0-10 KUV
	LO-HI RF SET to LINE control and LO RF UV	Adjust for 10 microvolt.
	DEVIATION RANGE KHZ switch	10
	DEVIATION control	Midrange position
AN/URM-127	Freq dial	10
	FREQ RANGE MULTIPLIER	X 100
	OUTPUT CONTROL	As required to produce 8 kHz deviation on AN/URM-103.

TEST PROCEDURE

1. Adjust AN/URM-127 output level for 8 kHz deviation as indicated on AN/URM-103 modulation meter.
2. Adjust AN/URM-103 for an output of 10 microvolt at 30.00 MHz.
3. Determine that RECEIVER AUDIO OUTPUTS J107 HI - LO on test set is connected to METER INPUT terminals of the TS-723A/U.
4. Reduce AN/URM-103 output to minimum. Observe audio output on TS-723A/U meter.

STANDARD. No audio present.

5. If audio is present on the spectrum analyzer, see troubleshooting chart 2-11.
6. Increase AN/URM-103 output until an audio output signal is observed on TS-723A/U meter.

2-9. RECEIVER CARRIER SQUELCH SENSITIVITY TEST. (CONT)

STANDARD. Audio is present.

7. If audio is not present, see troubleshooting chart 2-11.

8. Observe AN/URM-103 output level (squelch pull-in).

STANDARD. 0.7 microvolt maximum

9. If AN/URM-103 output level is more than 0.7 microvolt, see troubleshooting chart 2-11.
10. Reduce AN/URM-103 output level until audio output indication disappears. Observe AN/URM-103 output level (squelch dropout).

STANDARD. 0.55 microvolt maximum

11. If AN/URM-103 output level is more than 0.55 microvolt, see troubleshooting chart 2-11.
12. Press SQ DIS switch on front panel of RT-823/ARC-131.

STANDARD. Audio is present.

13. If audio is not present, see troubleshooting chart 2-11.
14. Repeat steps 1 through 13, adjusting TS-2575/ARC-131 for each of the following frequencies: 41.00 MHz, 52.00 MHz, 65.00 MHz, and 75.00 MHz.
15. Set mode switch on TS-2575/ARC-131 to RETRAN.
16. Set SQUELCH switch on TS-2575/ARC-131 to CARR.
17. Set VOL control on TS-2575/ARC-131 to midrange.
18. Set C-1611 D/AIC VOL control to midrange.
19. Disconnect cable CG-3371/U (W7) from NORMAL J107 and reconnect to REXMIT J109 on test set.
20. Repeat steps 1 through 14 and observe the following conditions.

CONDITION	STANDARD	IF STANDARD IS NOT VERIFIED, SEE TROUBLESHOOTING CHART
With RETRANSMIT RCVR lamp illuminated	1000 Hz tone is present in speaker and headset,	2-11
Voltmeter reading on TS-723A/U	2.17 to 3.45	2-11
RETRANSMIT RCVR lamp not illuminated	No audio signal present.	2-11

2-10. RECEIVER TONE SQUELCH SENSITIVITY TEST.

PURPOSE

This test checks the squelch capability when tone squelch is selected on the control unit. Squelching and unsquelching in the TONE mode occur at various voltage levels.

TEST EQUIPMENT AND MATERIALS

Maintenance Kit MK-1035/ARC-131
Signal Generator AN/URM-103
Signal Generator AN/URM-127 (2 units required)
Spectrum Analyzer TS-723A/U
Electronic Counter Digital Readout AN/USM-207
Fuseholder MX-1730/U
Power Supply PP-2953/U
All cables are part of MK-1035/ARC

NOTE

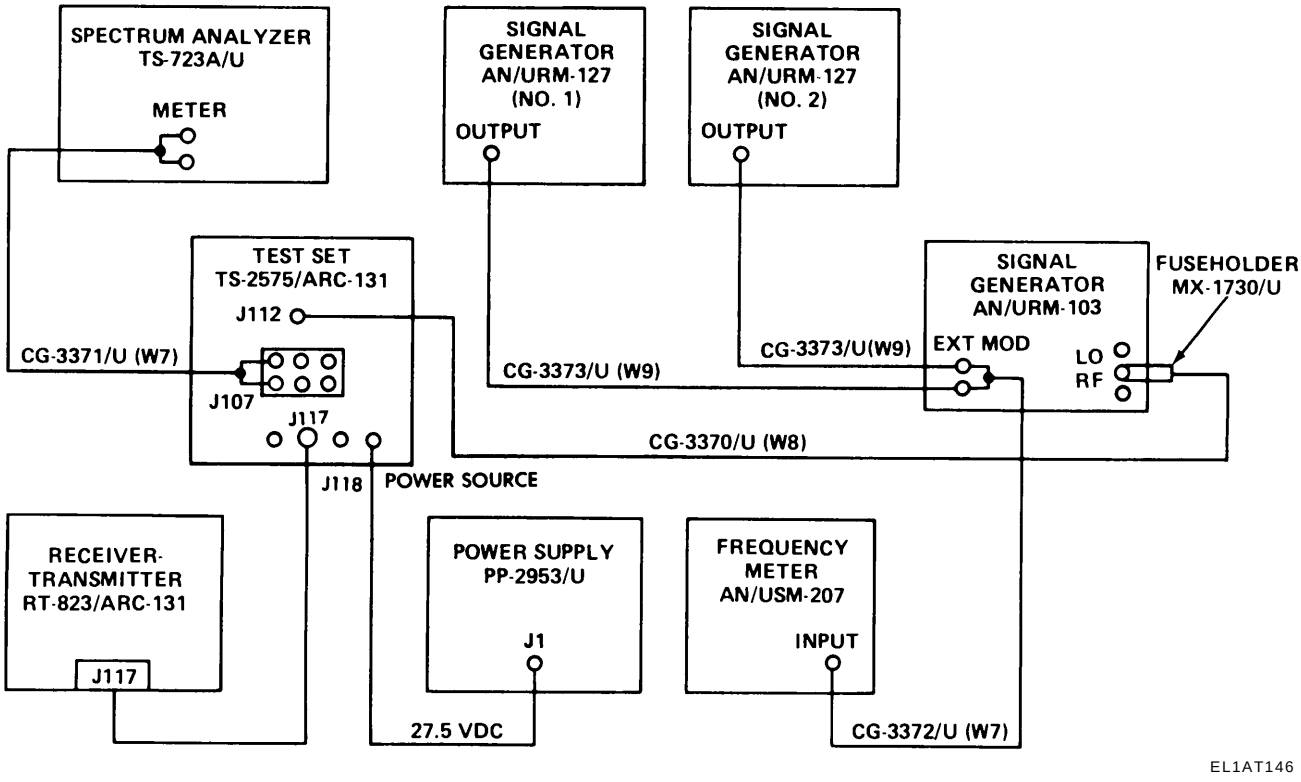
When two AN/URM-127 units are tied together, they must have enough output to deviate the fm signal generator at least 8 kHz.

Control Unit C-7088/ARC-131 installed in Test Set TS-2575/ARC-131 must contain a jumper wire between E3 and E4 on switch rear mount marked TONE to perform tone squelch sensitivity check.

2-10. RECEIVER TONE SQUELCH SENSITIVITY TEST. (CONT)

TEST SETUP

Connect equipment as shown in test setup diagram. Turn on both AN/URM-127 units and set their amplitude controls for a zero output. Turn on all equipment and allow at least 5 minutes for warmup.



INITIAL EQUIPMENT CONTROL SETTINGS

Set equipment controls as indicated in the following table.

2-10. RECEIVER TONE SQUELCH SENSITIVITY TEST. (CONT)

CONTROL AND SWITCH SETTINGS

EQUIPMENT	CONTROL OR SWITCH	POSITION/SETTING
TS-2575/ARC-131	MODE SWITCH	T/R
	VOL	Maximum (clockwise)
	SQUELCH	CARR
	FREQ set	30.00 MHz
TS-723A/U	FUNCTION switch	DISTORTION
	RANGE	X 10
	AF-RF switch	AF
AN/URM-103	BAND SWITCH and RF TUNING CONTROL	Adjust to 30.00 MHz.
	FUNCTION switch	EXT MOD
	RF OUTPUT switch	LO 0-10 KUV
	LO-HI RF SET to LINE CONTROL and LO RF UV	Adjust as required in procedures.
	DEVIATION RANGE KHZ switch	10
	DEVIATION CONTROL	Midrange position

TEST PROCEDURE

1. Adjust AN/URM-103 for 30.00 MHz as indicated by minimum distortion on TS-723A/U.
2. Set the SQUELCH switch on TS-2575/ARC-131 to TONE.
3. Adjust AN/URM-127 (no. 2) output frequency to 150 Hz as indicated on AN/USM-207 readout.
4. Adjust output level of AN/URM-127 (no. 2) to produce 1 kHz deviation as indicated on AN/URM-103 meter.
5. Adjust AN/URM-127 (no. 1) output frequency to 1000 Hz.
6. Adjust output level of AN/URM-127 (no. 2) to produce 8 kHz deviation as indicated on AN/URM-103 meter.
7. Reduce AN/URM-103 output to minimum. Monitor audio output on the TS-723A/U meter.
8. Increase AN/URM-103 output until an audio output indication is observed.

STANDARD. Audio is present.

9. If audio is not present, see troubleshooting chart 2-12.
10. Observe AN/URM-103 output level (squelch pull-in).

STANDARD. 0.5 microvolt maximum

11. If AN/URM-103 output level is more than 0.5 microvolt, see troubleshooting chart 2-12.

2-10. RECEIVER TONE SQUELCH SENSITIVITY TEST. (CONT)

12. Reduce AN/URM-103 output level until audio output indication disappears, and observe AN/URM-103 output level (squelch dropout).

STANDARD. 0.4 microvolt

13. If AN/URM-103 output level does not indicate 0.4 microvolt, see troubleshooting chart 2-12.
14. Repeat steps 1 through 14, adjusting the TS-2575/ARC-131 for each of the following frequencies: 41.00 MHz, 52.00 MHz, 53.00 MHz, 65.00 MHz, and 75.00 MHz.

2-11. TRANSMITTER POWER OUTPUT TEST.

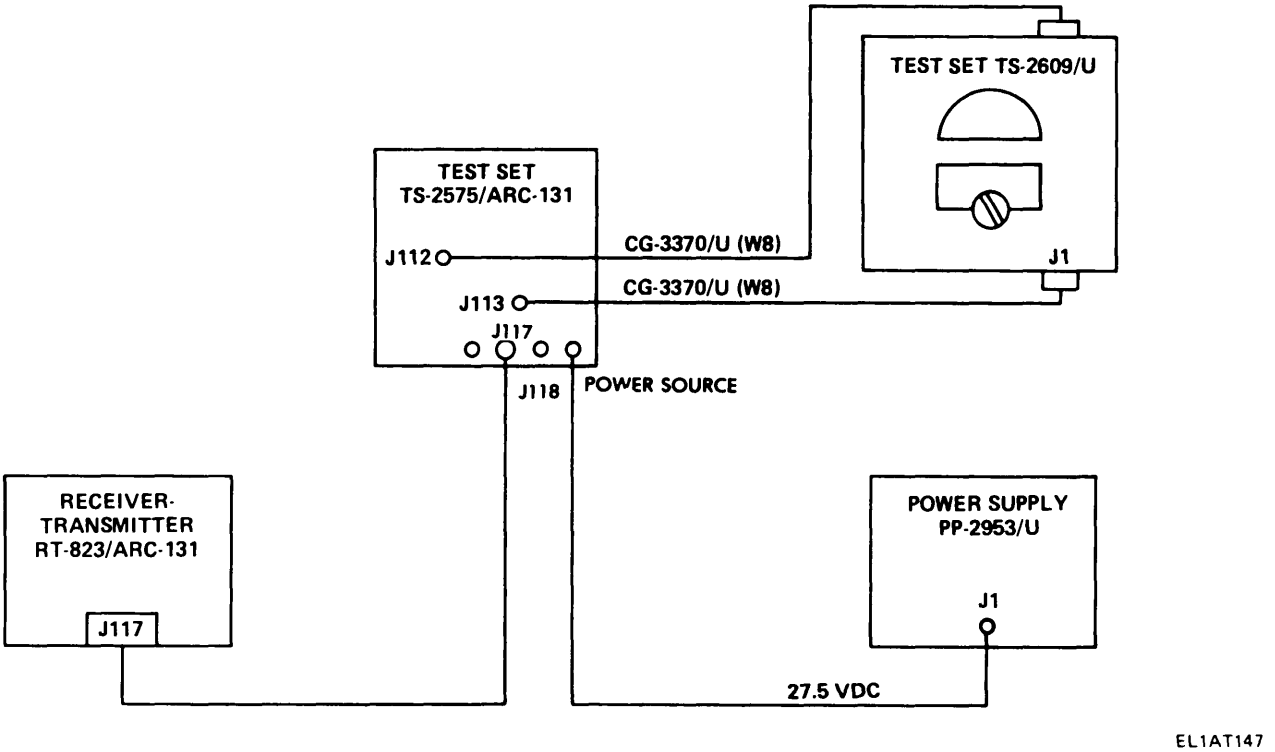
PURPOSE

This test checks the rt's ability to transmit a modulated rf carrier with sufficient power. Radio is keyed, and power output is measured with a wattmeter.

TEST EQUIPMENT AND MATERIALS

Maintenance Kit MK-1035/ARC-131
Radio Frequency Power Test Set TS-2609/U
Power Supply PP-2953/U
All cables are part of MK-1035/ARC
TEST SETUP

Connect equipment as shown in test setup diagram. Turn on ail equipment and allow at least 5 minutes for warmup.



EL1AT147

2-11. TRANSMITTER POWER OUTPUT TEST. (CONT)

INITIAL EQUIPMENT CONTROL SETTINGS

Set equipment controls as indicated in the following table.

CONTROL AND SWITCH SETTINGS

EQUIPMENT	CONTROL OR SWITCH	POSITION/SETTING
TS-2575/ARC-131	MODE SWITCH	T/R
	VOL	Maximum (clockwise)
	SQUELCH	DIS
	FREQ sel	30.00 MHz
	HI-LO switch	HI
	TRANSMIT switch	OFF
TS-2609/U	Selector switch	FWD 100
C-1611 D/AIC	Transmit-Interphone selector	1
	RECEIVER 1 switch	ON

TEST PROCEDURE

CAUTION

To avoid damage to wattmeter, ensure selector switch is at FWD 100 when receiver-transmitter HI-LO switch is in the Hi position.

1. Set test set TRANSMIT switch to ON. Observe wattmeter indication.

STANDARD. 10 watts minimum

2. If wattmeter indicates less than 10 watts, see troubleshooting chart 2-13.
3. Repeat steps 1 and 2, adjusting TS-2575/ARC-131 for each of the following frequencies: 42.00 MHz, 52.95 MHz, 53.00 MHz, 65.00 MHz, and 75.95 MHz.
4. Set test set TRANSMIT switch to OFF.
5. Set wattmeter selector switch to FWD 10.
6. Set receiver-transmitter XMTR HI-LO switch to LO.
7. Set TRANSMIT switch on test set to ON. Observe wattmeter indication.

STANDARD. 0.5 watts minimum

8. If wattmeter indication is less than 0.5 watts, see troubleshooting chart 2-14.
9. Repeat steps 4 through 8, adjusting TS-2575/ARC-131 for each of the following frequencies: 42.00 MHz, 52.95 MHz, 53.00 MHz, 65.00 MHz, and 75.95 MHz.

2-12. TRANSMITTER TONE MODULATION TEST.

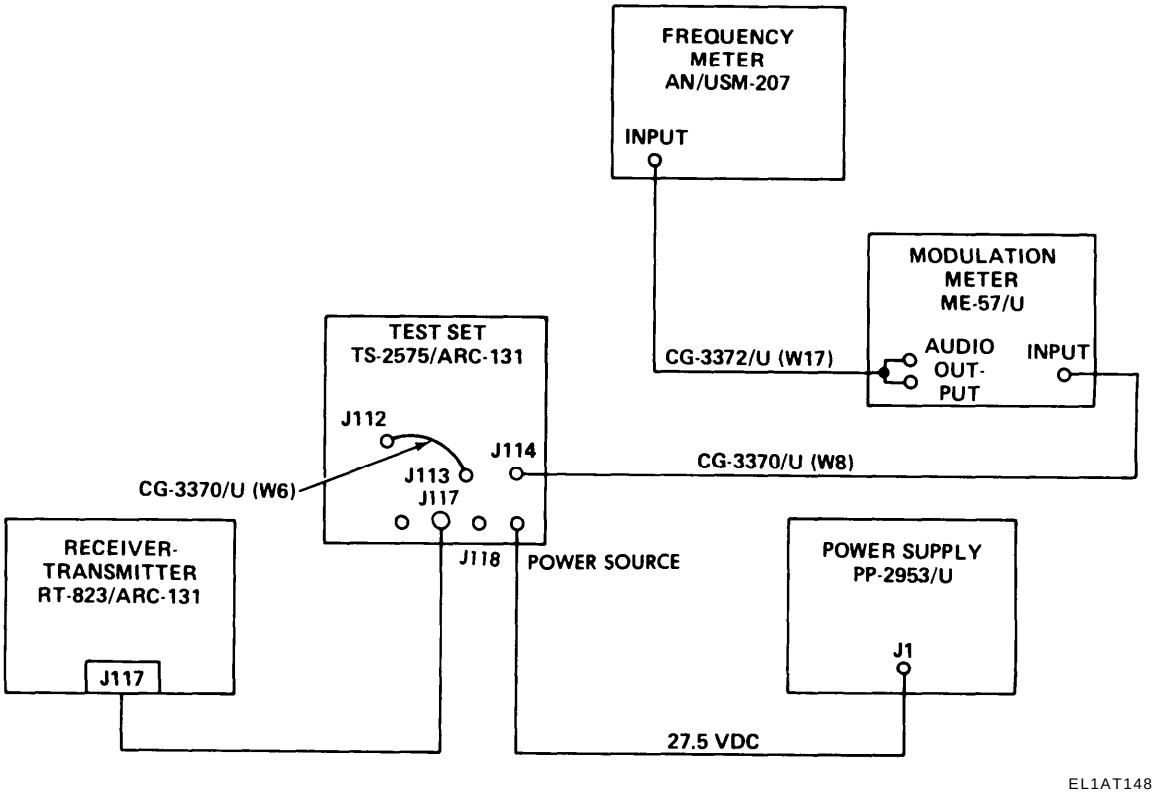
PURPOSE

This test checks the frequency and deviation of the 150 Hz tone signal generated in the rt when the mode switch is set at T/R.

TEST EQUIPMENT AND MATERIALS

Maintenance Kit MK-1035/ARC-131
Electronic Counter Digital Readout AN/USM-207
Modulation Meter ME-57/U
Power Supply PP-2953/U
All cables are port of MK-1035/ARC
TEST SETUP

Connect equipment as shown in test setup diagram. Turn on all equipment and allow at least 5 minutes for warmup.



Set equipment controls as indicated in the following table.

2-12. TRANSMITTER TONE MODULATION TEST. (CONT)

CONTROL AND SWITCH SETTINGS

EQUIPMENT	CONTROL OR SWITCH	POSITION/SETTING
TS-2575/ARC-131	MODE SWITCH	T/R
	VOL	Maximum (clockwise)
	SQUELCH	DIS
	FREQ sel	75.95 MHz
	TRANSMIT switch	OFF
ME-57/U	TUNING	75.95 MHz
	DEVIATION RANGE – KC	20
	FREQUENCY RANGE – MC	55-120
	Selector switch	TUNE
C-1611 D/AlC	Transmit-Interphone selector	1
	RECEIVER 1 switch	ON

TEST PROCEDURE

1. Set test set TRANSMIT switch to ON and measure frequency and deviation of 150 Hz transmitter tone signal.

STANDARD. frequen - 148 Hz to 152 Hz
deviation – 2.5 kHz to 3.5 kHz

2. If frequency and deviation are not within tolerances of the standard, see troubleshooting chart 2-15.
3. Set test set SQUELCH switch to CARR.

STANDARD. frequen – 148 Hz to 152 Hz
deviation – 2.5 kHz to 3.5 kHz

4. If frequency and deviation are not within the tolerances of the standard, see troubleshooting chart 2-15.
5. Set test set SQUELCH switch to TONE and measure the frequency and deviation of the 150 Hz transmitter tone signal.

STANDARD. frequen – 148 kHz to 152 Hz
deviation – 2.5 kHz to 3.5 kHz

6. If frequency and deviation are not within tolerances of the standard, see troubleshooting chart 2-15.

2-13. TRANSMIIIER DEVIATION NARROW BAND TEST.

PURPOSE

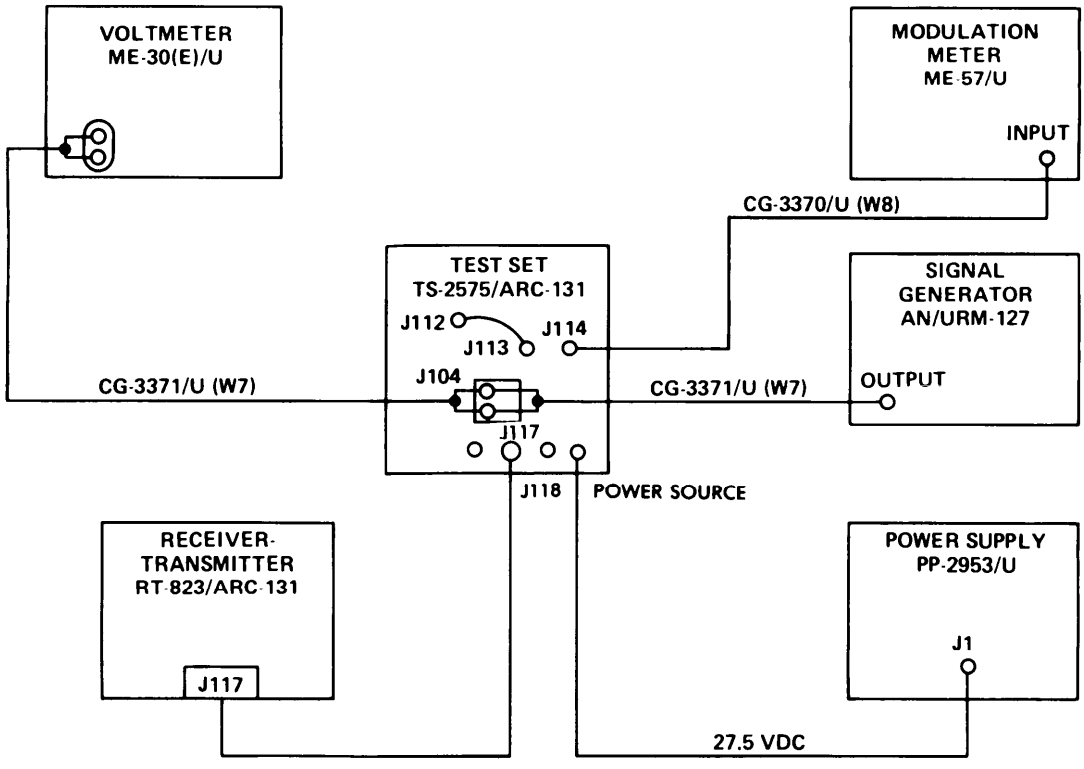
This test checks the transmitter deviation when the rt is transmitting rf signals. Deviation occurs as a result of transmitting harmonic and beat frequencies.

TEST EQUIPMENT AND MATERIALS

Maintenance Kit MK-1035/ARC-131
Signal Generator AN/URM-127
Electronic Voltmeter ME-30(E)/U
Modulation Meter ME-57/U
Power Supply PP-2953/U
All cables are part of MK-1035/ARC

TEST SETUP

Connect equipment as shown in test setup diagram. Turn on all test equipment and allow at least 5 minutes for warmup.



EL1AT149

2-13. TRANSMITTER DEVIATION NARROW BAND TEST. (CONT)

INITIAL EQUIPMENT CONTROL SETTINGS

Set equipment controls as indicated in the following table.

CONTROL AND SWITCH SETTINGS

EQUIPMENT	CONTROL OR SWITCH	POSITION/SETTING
TS-2575/ARC-131	MODE SWITCH	T/R
	VOL	Maximum (clockwise)
	SQUELCH	DIS
	FREQ sel	30.00 MHz
	TRANSMIT switch	OFF
	HI-LO switch	LO
AN/URM-127	Freq dial	10
	FREQ RANGE MULTIPLIER	X 100
	OUTPUT CONTROL	As specified in procedure.
ME-30(E)/U	RANGE	1 volt
ME-57/U	TUNING	30.00 MHz
	DEVIATION RANGE – KC	20
	FREQUENCY RANGE – MC	20-55
	Selector switch	TUNE
C-1611 D/AIC	Transmit-Interphone selector	1
	RECEIVER 1 switch	ON

TEST PROCEDURE

1. Disable the 150 Hz tone generator by placing test set WIDEBAND – NAR BAND switch to WIDEBAND.
2. Adjust AN/URM-127 OUTPUT CONTROL for 0.39 volt output as indicated on ME-30(E)/U.
3. Place test set TRANSMIT switch to ON and observe transmitter deviation.

STANDARD. 6 kHz to 10 kHz

4. If transmitter deviation is not within the limits of the standard, see troubleshooting chart 2-16.
5. Repeat steps 1 through 4, adjusting TS-2575/ARC-131 for each of the following frequencies: 52.00 MHz, 54.00 MHz, and 75.00 MHz.

2-14. TRANSMITTER DISTORTION NARROW BAND TEST.

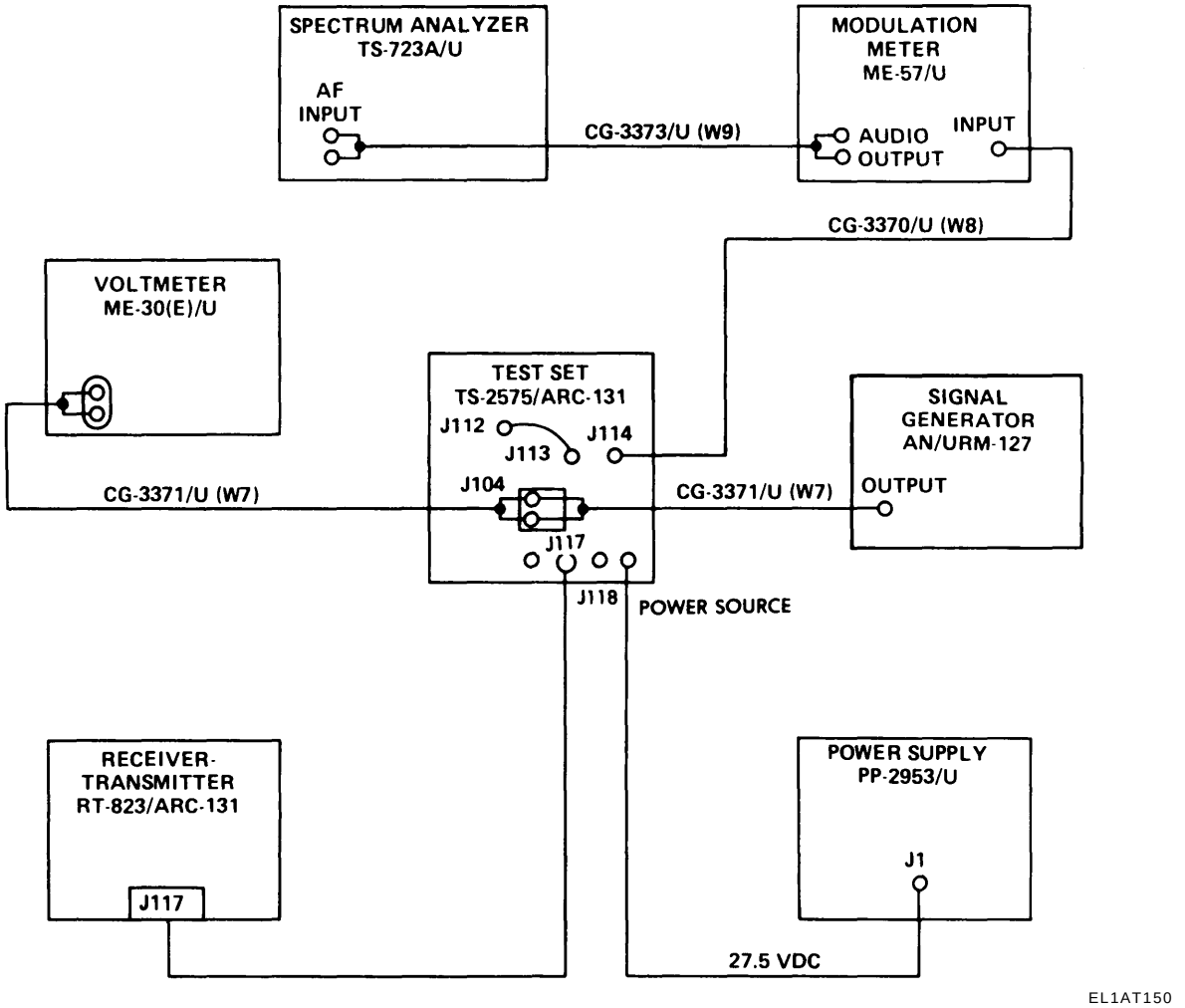
PURPOSE

Distortion will ruin the quality of an audio signal and must, therefore, be kept at the lowest possible level. This test measures the percentage of distortion in the signal transmitted by the rt.

TEST EQUIPMENT AND MATERIALS

Maintenance Kit MK-1035/ARC-131
Signal Generator AN/URM-127
Spectrum Analyzer TS-723A/U
Modulation Meter ME-57/U
Electronic Voltmeter ME-30(E)/U
Power Supply PP-2953/U
All cables are part of MK-1035/ARC
TEST SETUP

Connect equipment as shown in test setup diagram. Turn on all equipment and allow at least 5 minutes for warmup.



EL1AT150

2-14. TRANSMIITER DISTORTION NARROW BAND TEST. (CONT)

INITIAL EQUIPMENT CONTROL SETTINGS

Set equipment controls as indicated in the following table.

CONTROL AND SWITCH SETTINGS

EQUIPMENT	CONTROL OR SWITCH	POSITION/SETTING
TS-2575/ARC-131	MODE SWITCH	T/R
	VOL	Maximum (clockwise)
	SQUELCH	DIS
	FREQ sel	30.00 MHz
	TRANSMIT switch	OFF
	HI-LO switch	LO
AN/URM-127	Freq dial	10
	FREQ RANGE MULTIPLIER	X 100
	OUTPUT CONTROL	As specified in test procedure.
ME-57/U	TUNING	30 MHz
	DEVIATION RANGE – KC	20
	FREQUENCY RANGE – MC	20.55 MHz
	Selector switch	TUNE
TS-723A/U	FUNCTION switch	DISTORTION
	RANGE	X 10
	AF-RF switch	AF
C-1611 D/AIC	Transmit-Interphone selector	1
	RECEIVER 1 switch	ON

TEST PROCEDURE

1. Adjust AN/URM-27 OUTPUT CONTROL for a 0.39 volt output level as indicated on ME-30(E)/U voltmeter.
2. Place test set TRANSMIT switch to ON.
3. Measure transmitter distortion at the output of ME-57/U.

STANDARD. 10 percent maximum

4. If reading on modulation meter is above 10 percent, see troubleshooting chart 2-17.
5. Set test set TRANSMIT switch to OFF.
6. Set test set FREQ sel to 75.95 MHz.
7. Repeat steps 1 through 5.

2-15. TRANSMITTER SIGNAL PLUS NOISE-TO-NOISE RATIO TEST.

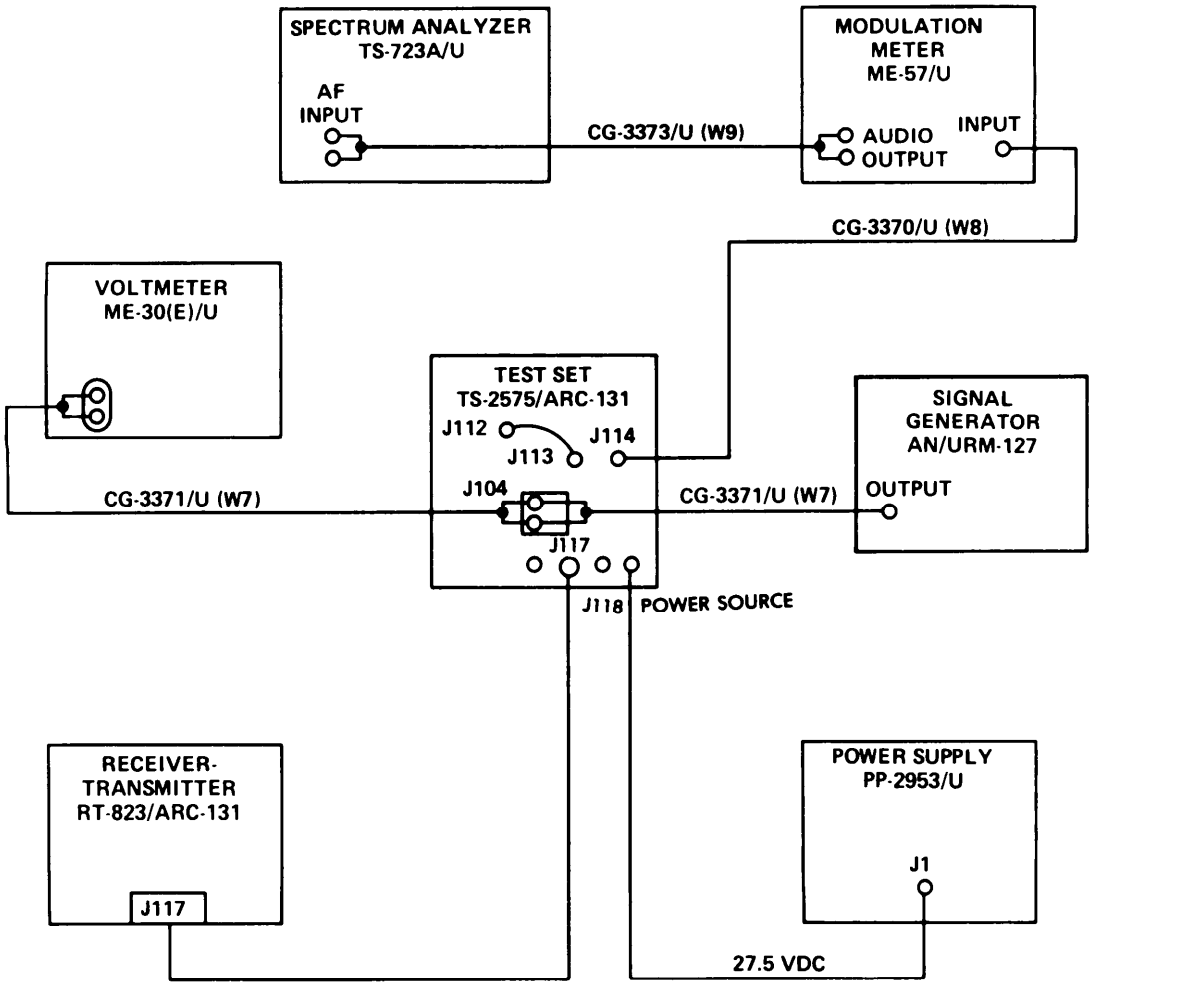
PURPOSE

This test checks the transmitted power to noise ratio. Transmitted noise must be 35 db below transmitted power.

TEST EQUIPMENT AND MATERIALS

Maintenance Kit MK-1035/ARC-131
Modulation Meter ME-57/U
Spectrum Analyzer TS-723A/U
Signal Generator AN/URM-127
Electronic Voltmeter ME-30(E)/U
Power Supply PP-2953/U
All cobles are part of MK-1035/ARC
TEST SETUP

Connect equipment as shown in test setup diagram. Turn on all equipment and allow at least 5 minutes for warmup.



EL1AT150

2-15. TRANSMITTER SIGNAL PLUS NOISE-TO-NOISE RATIO TEST. (CONT)

INITIAL EQUIPMENT CONTROL SETTINGS

Set equipment controls as indicated in the following table.

CONTROL AND SWITCH SETTINGS

EQUIPMENT	CONTROL OR SWITCH	POSITION/SETTING
RT-823/ARC-131	XMTR HI-LO	LO
TS-2575/ARC-131	MODE SWITCH	T/R
	VOL	Maximum (clockwise)
	SQUELCH	DIS
	FREQ sel	30.00 MHz
	HI-LO switch	LO
	TRANSMIT switch	OFF
AN/URM-127	Freq dial	10
	FREQ RANGE MULTIPLIER	X 1000
	OUTPUT CONTROL	As specified in procedure.
ME-30(E)/U	TUNING	30.00 MHz
	DEVIATION RANGE – KC	20
	FREQUENCY RANGE – MC	20-55 MHz
	Selector switch	TUNE
TS-723A/U	FUNCTION switch	SET LEVEL
	RANGE	X 10
	AF-RF SWITCH	AF
C-1611 D/AIC	Transmit-Interphone selector	1
	RECEIVER 1 switch	ON

PROCEDURE

1. Adjust AN/URM-127 OUTPUT CONTROL for a 0.39 volt output level as indicated on ME-30(E)/U.
2. Place test set TRANSMIT switch to ON.
3. Adjust TS-723A/U signal INPUT control for 0 db reference on meter.
4. Remove the modification from the receiver/transmitter by disconnecting AN/URM-127 from test set J104 HI-LO terminals.
5. Observe difference in TS-723A/U meter indication from the 0 db reference established in step 3.

STANDARD. 35 db difference

6. If meter indication on spectrum analyzer does not indicate 35 db, see troubleshooting chart 2-18.

2-16. TRANSMITTER FREQUENCY STABILITY TEST.

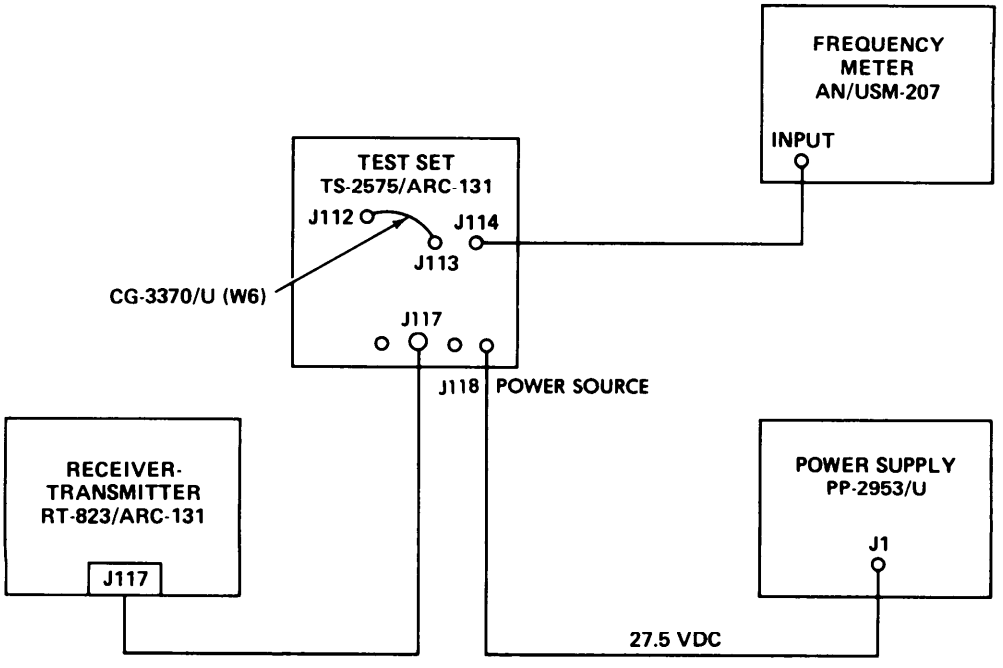
PURPOSE

This test checks the frequency of the transmitter power at several points on the rt's bandwidth.

TEST EQUIPMENT AND MATERIALS

Maintenance Kit MK-1035/ARC-131
Electronic Counter Digital Readout AN/USM-207
Power Supply PP-2953/U
All cables are part of MK-1035/ARC
TEST SETUP

Connect equipment as shown in test setup diagram. Turn on all equipment and allow at least 5 minutes for warmup.



EL1AT151

2-16. TRANSMITTER FREQUENCY STABILITY TEST. (CONT)

INITIAL EQUIPMENT CONTROL SETTINGS

Set equipment controls as indicated in the following table.

CONTROL AND SWITCH SETTINGS

EQUIPMENT	CONTROL OR SWITCH	POSITION/SETTING
RT-823/ARC-131	XMTR HI-LO	LO
TS-2575/ARC-131	MODE SWITCH	T/R
	SQUELCH	CARR
	FREQ sel	75.05 MHz
	TRANSMIT switch	OFF
	HI-LO switch	LO
C-1611 D/AIC	Transmit-Interphone selector	1
	RECEIVER 1 switch	ON
AN/USM-207	GATE TIME (see - 1)	10^4
	FUNCTION switch	FREQ
	POWER switch	TRACK

TEST PROCEDURE

1. Place test set TRANSMIT switch to ON and observe the output frequency as indicated on AN/USM-207 readout.

STANDARD. 75.05 ± 3.5 kHz

2. If reading on Frequency Counter AN/URM-207 is not within limits of the standard, see trouble-shooting chart 2-19.
3. Place test set TRANSMIT switch to OFF position.
4. Repeat steps 1 through 3 adjusting the FREQ sel on TS-2575/ARC-131 for each of the following frequencies: 30.00 MHz, 52.00 MHz, 53.00 MHz, 75.00 MHz, 75.10 MHz, 75.20 MHz, 75.30 MHz, 75.40 MHz, 75.50 MHz, 75.60 MHz, 75.70 MHz, 75.80 MHz, and 75.90 MHz.

NOTE

The standard for the frequencies selected in step 4 is the frequency selected ±3.5 kHz.

2-17. TRANSMITTER AUTOMATIC FREQUENCY SELECTION AND CHANNEL CHANGING TONE TEST.

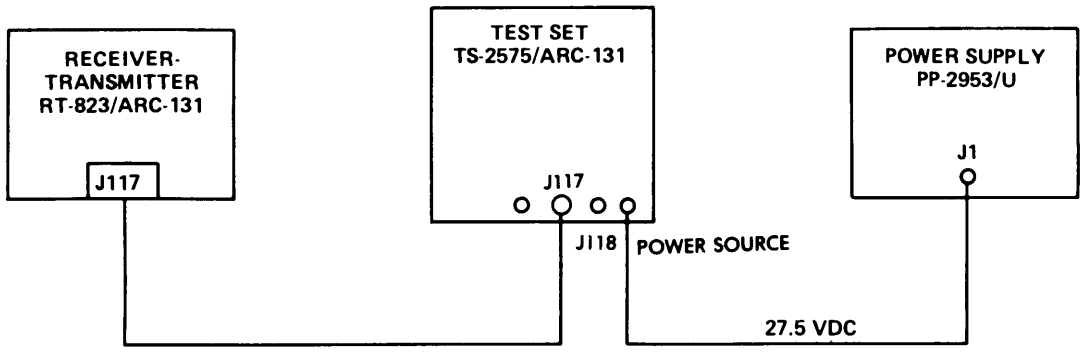
PURPOSE

This test checks the rt's ability to tune to a selected frequency automatically in a specified period of time. This test also checks the 800 Hz tone generated when the rt is transmitting.

TEST EQUIPMENT AND MATERIALS

Maintenance Kit MK-1035/ARC-131
Power Supply PP-2953/U
Stopwatch
All cables are part of MK-1035/ARC

Connect equipment as shown in test setup diagram. Turn on all equipment and allow at least 5 minutes for warmup.



EL1AT152

INITIAL EQUIPMENT CONTROL SETTINGS

Set equipment controls as indicated in the following table.

CONTROL AND SWITCH SETTINGS

EQUIPMENT	CONTROL OR SWITCH	POSITION/SETTING
TS-2575/ARC-131	MODE SWITCH SQUELCH FREQ sel VOL	T/R DIS 30.00 MHz Maximum (clockwise)

2-17. TRANSMITTER AUTOMATIC FREQUENCY SELECTION AND CHANNEL CHANGING TONE TEST. (CONT)

TEST PROCEDURE

1. Set frequency selectors to 30.00 MHz and allow radio set to tune; then set MODE SWITCH to OFF.
2. Change frequency selectors to 75.00 MHz and set MODE SWITCH to T/R.
3. Using a stopwatch, measure time required for tuning.

STANDARD. 7 seconds maximum

4. If radio set takes longer than 7 seconds to tune, see troubleshooting chart 2-20.
5. Monitor test set speaker for 800 Hz tone during tuning process.

STANDARD. Tone present

6. If no tone was present during tuning process, see troubleshooting chart 2-20.
7. Repeat steps 1 through 6 adjusting the frequency selector switches on test set for the following frequencies.

INITIAL TEST SET FREQUENCY	WITH MODE SWITCH OFF, CHANGE TO:
75.00 MHz	30.00 MHz
45.00 MHz	46.00 MHz
46.00 MHz	45.00 MHz
50.00 MHz	50.95 MHz
50.95 MHz	50.00 MHz
30.00 MHz	31.00 MHz
31.00 MHz	30.00 MHz

2-18. TRANSMITTER SIDETONE TEST.

PURPOSE

This test checks the power level of the sidetone signal generated in the rt when fm rf is transmitted.

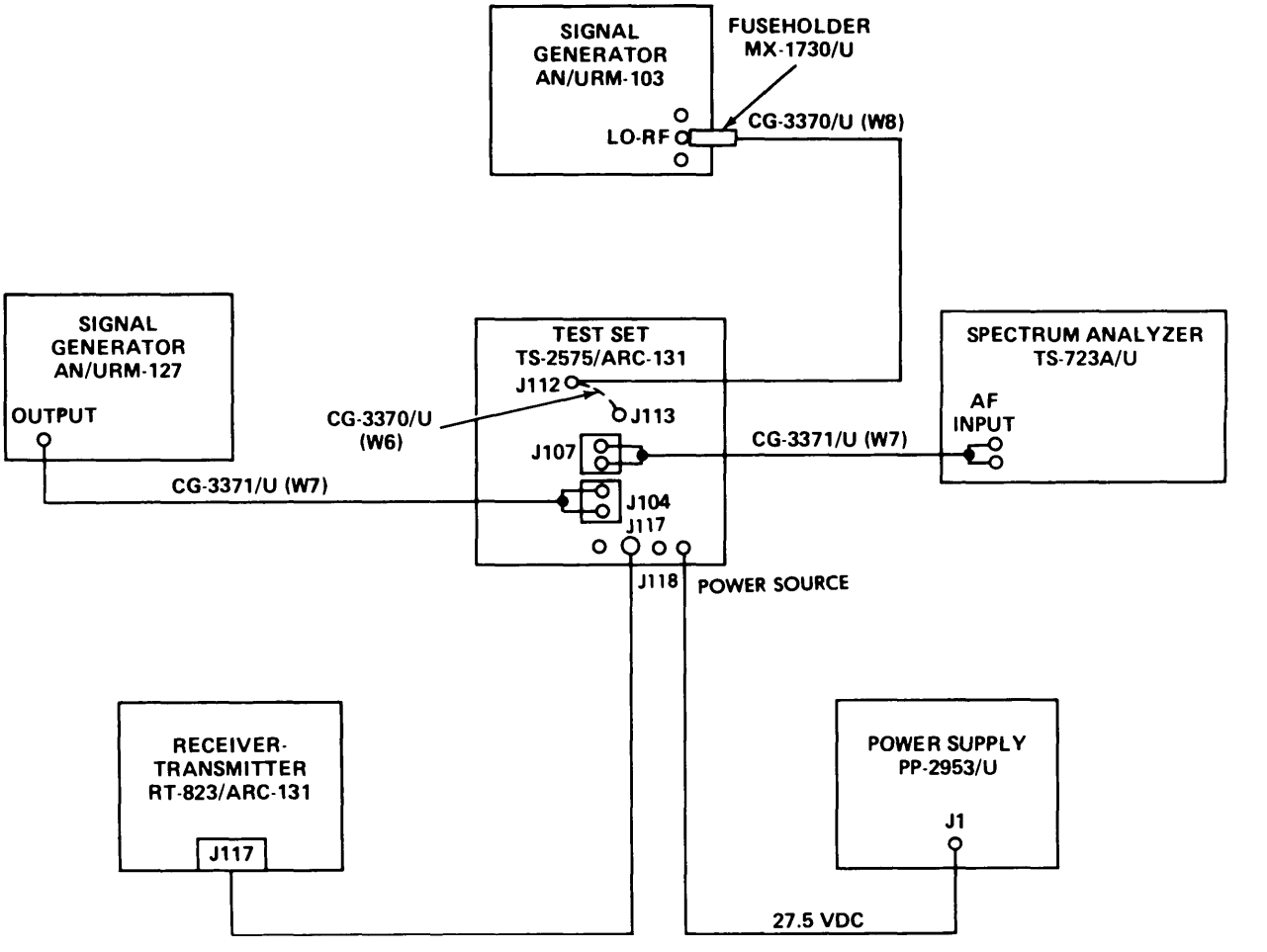
TEST EQUIPMENT AND MATERIALS

Maintenance Kit MK-1035/ARC-131
Signal Generator AN/URM-103
Signal Generator AN/URM-127
Spectrum Analyzer TS-723A/U
All cables are part of MK-1035/ARC
Fuseholder MX-1730/U
Power Supply PP-2953/U

2-18. TRANSMITTER SIDETONE TEST. (CONT)

TEST SETUP

Connect equipment as shown in test setup diagram. Turn on all equipment and allow at least 5 minutes for warmup.



EL1AT153

INITIAL EQUIPMENT CONTROL SETTINGS

Set equipment controls as indicated in the following table.

2-18. TRANSMITTER SIDETONE TEST. (CONT)

CONTROL AND SWITCH SETTINGS

EQUIPMENT	CONTROL OR SWITCH	POSITION/SETTING
TS-2575/ARC-131	MODE SWITCH SQUELCH VOL FREQ sel	T/R DIS Maximum (clockwise) 31.00 MHz
C-1611 D/AIC	Transmit-Interphone selector	1
AN/URM-127	Freq dial FREQ RANGE MULTIPLIER OUTPUT CONTROL	100 X 10 As specified in procedure.
TS-723A/U	FUNCTION switch RANGE AF-RF switch Meter RANGE	SET LEVEL X 10 AF + 20 db
AN/URM-103	BAND SWITCH and RF TUNING CONTROL FUNCTION switch RF OUTPUT switch LO-HI RF SET to LINE control and LO RFUV DEVIATION RANGE KH7 switch DEVIATION control	Adjust to 31.00 MHz. 1000 Hz LO 0-10 KUV Adjust for 10 microvolt output. 10 Adjust for 8 kHz deviation.

TEST PROCEDURE

1. Adjust AN/URM-127 OUTPUT CONTROL for 0.39 volts output.
2. With TS-723A/U function switch at SET LEVEL, adjust signal INPUT control for a 0 db indication on the meter
3. Place test set WIDEBAND-NAR BAND switch to WIDEBAND.
4. Disconnect CG-3370/U (W8) from fuseholder MX-1730/U and connector J112 on test set.
5. Connect CG-3370/U (W6) to J112 and J113 on the test set.
6. Place test set TRANSMIT switch to ON.
7. Measure db level change on TS-723A/U meter output with reference to step 2.

STANDARD. With a 0 db reference, change in db should be 6 + _2db.

8. If reading on spectrum analyzer is not within limits of the standard, see troubleshooting chart 2-21.
9. Place test set TRANSMIT switch to OFF and reinstall CG-3370/U (W8) from J112 to fuseholder MX-1730/U
10. Repeat steps 2 through 9 adjusting frequency selectors of test set for frequencies of 51.50 MHz and 6895 MHz

2-19. HOMING SENSITIVITY TEST.

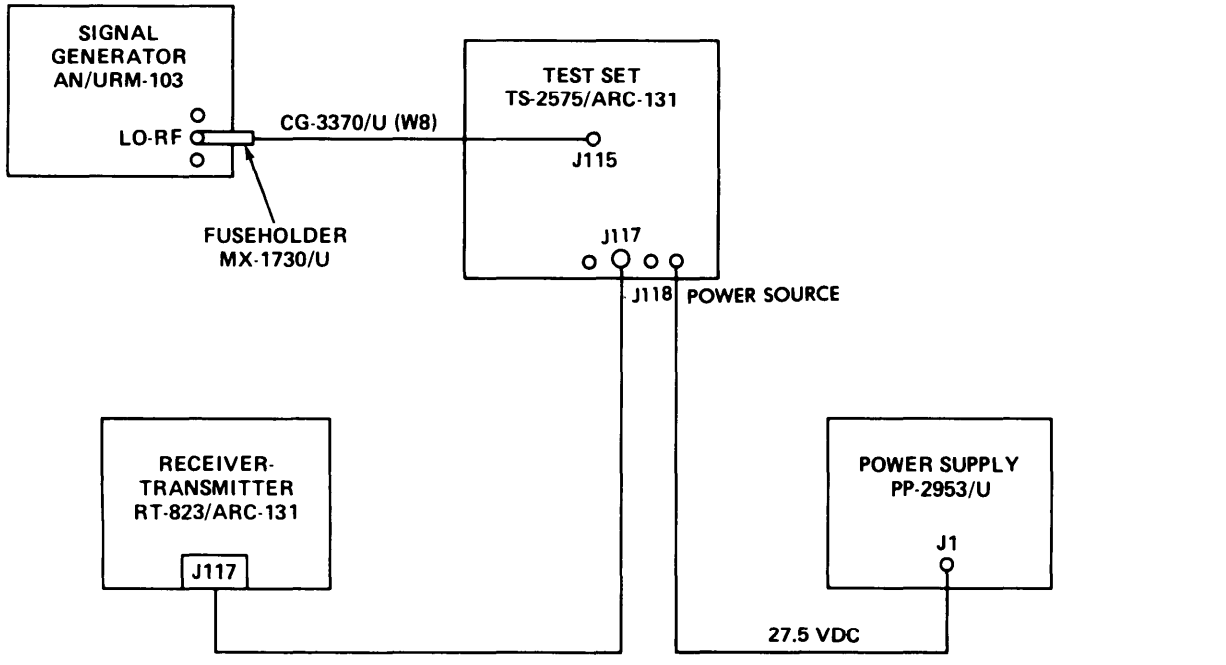
PURPOSE

This test checks homing signals that operate vertical and horizontal needles of homing indicator.

TEST EQUIPMENT AND MATERIALS

Maintenance Kit MK-1035/ARC-131
Signal Generator AN/URM-103
Fuseholder MX-1730/U
Power Supply PP-2953/U
All cables are part of MK-1035/ARC
TEST SETUP

Connect equipment as shown in test setup diagram. Turn on all equipment and allow at least 5 minutes for warmup.



EL1AT154

INITIAL EQUIPMENT CONTROL SETTINGS

Set equipment controls as indicated in the following table.

2-19. HOMING SENSITIVITY TEST. (CONT)

CONTROL AND SWITCH SETTINGS

EQUIPMENT	CONTROL OR SWITCH	POSITION/SETTING
TS-2575/ARC-131	MODE SWITCH SQUELCH FREQ sel LEFT and RIGHT HOMER ATTEN	HOME CARR 31.00 MHz 0
AN/URM-103	BAND SWITCH and RF TUNING control FUNCTION switch RF OUTPUT switch LO-HI RF SET to LINE control and LO RF UV	Adjust to 31.00 MHz. MOD OFF LO 0-10 KUV Adjust as required in procedure.

TEST PROCEDURE

1. Increase AN/URM-103 output by adjusting LO RF UV control until flags on homing Indicator lD-48A/ARN disappear.
2. Divide by two the AN/URM-103 dial indication observed in step 1.

STANDARD. 1.2 microvolt maximum

3. If quotient is more than 1.2 microvolt, see troubleshooting chart 2-22.
4. Repeat steps 1 through 3 adjusting test set for frequencies of 50.50 MHz and 68.95 MHz.
5. Set test set LEFT HOMER ATTEN control to 3 db and RIGHT HOMER ATTEN to 6 db.
6. Adjust AN/URM-103 Attenuator control for a 12 microvolt output signal.
7. Set frequency selectors to 31.00 MHz and tune AN/URM-103 to receiver frequency. Observe and record deflection of lD-48/ARN vertical needle.

STANDARD. Left length of wing minimum

8. If deflection of vertical needle does not meet requirement of the standard, see troubleshooting chart 2-23.
9. Reverse db settings of RIGHT and LEFT HOMER ATTEN. Record needle deflection.

STANDARD. Right length of wing minimum

10. If deflection of needle does not meet requirement of the standard, see troubleshooting chart 2-23.
11. Repeat steps 5 through 10 adjusting frequency selectors of test set for frequencies of 50.50 MHz and 68.95 MHz.

2-19. HOMING SENSITIVITY TEST. (CONT)

TEST PROCEDURE (CONT)

12. Adjust AN/URM-103 for zero input to the radio set.

STANDARD. Horizontal needle should be near bottom of homing indicator lD-48/ARN.

13. If horizontal needle is not near bottom of indicator, see troubleshooting chart 2-23.
14. Set test set FREQ sel for 31.00 MHz and LEFT and RIGHT HOMER ATTEN controls to 0.
15. Set AN/URM-103 DEVIATION RANGE KHZ switch to 10 and adjust DEVIATION control for 8 kHz deviation.
16. Adjust AN/URM-103 ATTENUATOR control for a 300 microvolt output signal.

STANDARD. Horizontal needle should be on first dot below center of homing indicator.

17. If horizontal needle is not as described in standard, see troubleshooting chart 2-23.
18. Adjust AN/URM-103 ATTENUATOR control for a 20,000 microvolt output signal.

STANDARD. Horizontal needle should be on first dot below center of homing indicator.

19. If horizontal needle is not as described in standard, see troubleshooting chart 2-23.
20. Repeat steps 16 through 19 adjusting the frequency selectors of the test set for frequencies of 50.50 MHz and 68.95 MHz.

2-20. C-7066/ARC-131 MODE SWITCH SELECTION AND FRONT PANEL ILLUMINATION TEST.

PURPOSE

This test checks for proper operation of the control unit mode switch and front panel lamp indicators.

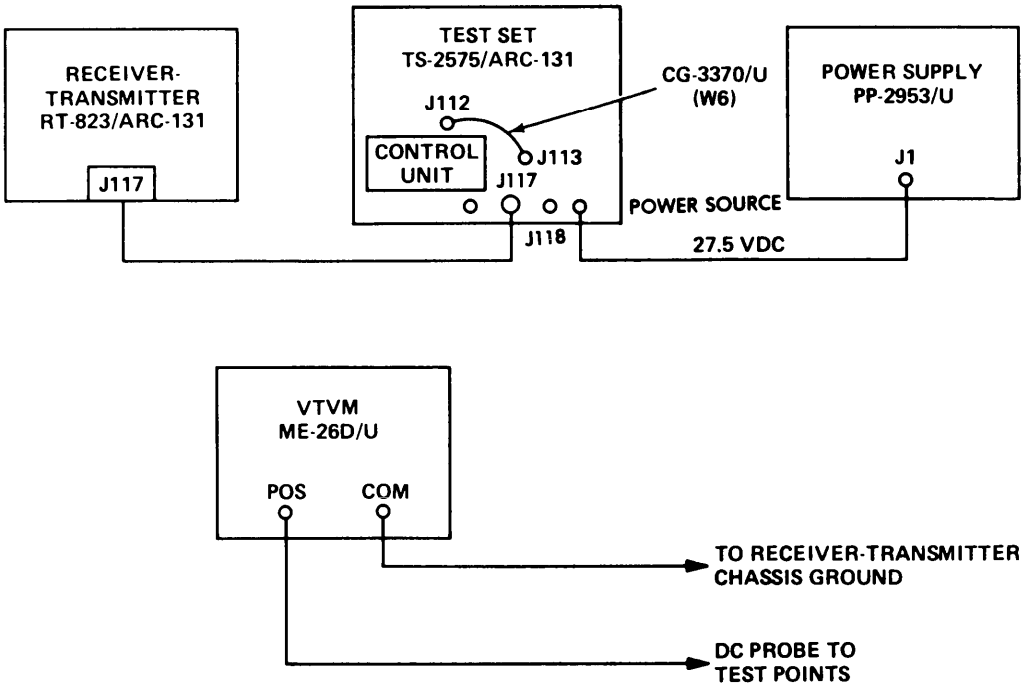
TEST EQUIPMENT AND MATERIALS

Maintenance Kit MK-1035/ARC-131
Receiver-Transmitter, Radio RT-823/ARC-131
Multimeter ME-26D/U
Power Supply PP-2953/U
All cables are part of MK-1035/ARC

2-20. C-7088/ARC-131 MODE SWITCH SELECTION AND FRONT PANEL ILLUMINATION TEST. (CONT)

TEST SETUP

Connect equipment as shown in test setup diagram. Remove receiver-transmitter case (para 2-39). Replace control unit in test set with control unit under test. Turn on all equipment and allow at least 5 minutes for warmup.



EL1AT155

INITIAL EQUIPMENT CONTROL SETTINGS

Set equipment controls as indicated in the following table.

CONTROL AND SWITCH SETTINGS

EQUIPMENT	CONTROL OR SWITCH	POSITION/SETTING
TS-2575/ARC-131	+28 VDC ON-OFF switch	OFF
	WIDEBAND-NAR BAND	NAR BAND
	TRANSMIT switch	OFF
	PILOT-ON	PILOT
	SPEAKER VOL	Maximum (clockwise)
RT-823/ARC-131	TEST SWITCH	1

2-20. C-7088/ARC-131 MODE SWITCH SELECTION AND FRONT PANEL ILLUMINATION TEST. (CONT)

TEST PROCEDURE

Set C-7088/ARC-131 MODE SWITCH to OFF and SQUELCH switch to DIS.
Set frequency selectors on C-7088/ARC-131 for 30.95 MHz.
Swing open amplifier modulator assembly on receiver-transmitter to permit viewing of MHz indicator on gearbox assembly.
Swing open if. amplifier assembly on receiver-transmitter to permit viewing kHz indicator on gearbox assembly.
Place test set +28 VDC ON-OFF switch to ON.
Adjust variable power source for + 27.5 VDC as indicated on INPUT VOLTAGE meter.
Place test set PILOT-ON switch to ON.

STANDARD. Control panel lamps illuminate.

8. If control panel lamps do not illuminate, see troubleshooting chart 2-24, item 1.
9. Set C-7088/ARC-131 MODE SWITCH to T/R.
10. Observe TEST METER indication on receiver-transmitter.

STANDARD. Midscale indication on TEST METER.

11. If TEST METER indication is not at midscale, see troubleshooting chart 2-24, item 2.
12. Set C-1611 D/AIC Transmit-Interphone selector to 1.
13. Set C-1611 D/AIC RECEIVER 1 to ON and adjust VOL fully clockwise.
14. Set test set TRANSMIT switch to MOM.

STANDARD. Receiver-transmitter power supply blower motor should run.

15. If blower motor is not operating, see troubleshooting chart 2-24, item 3.
16. Set test set TRANSMIT switch to OFF.
17. Set ME-26 D/U FUNCTION switch to + and set RANGE for 30 V.
18. Set C-7088/ARC-131 MODE SWITCH to HOME.
19. Connect test probe from the ME-26 D/U to TP4504 located on rf control assembly of receiver-transmitter.

STANDARD. + 27.5 VDC at TP4504.

20. If the voltage level at TP4504 is not 27.5 vdc, see troubleshooting chart 2-24, item 4.

2-21. SQUELCH SWITCH AND FREQUENCY SELECTION TEST.

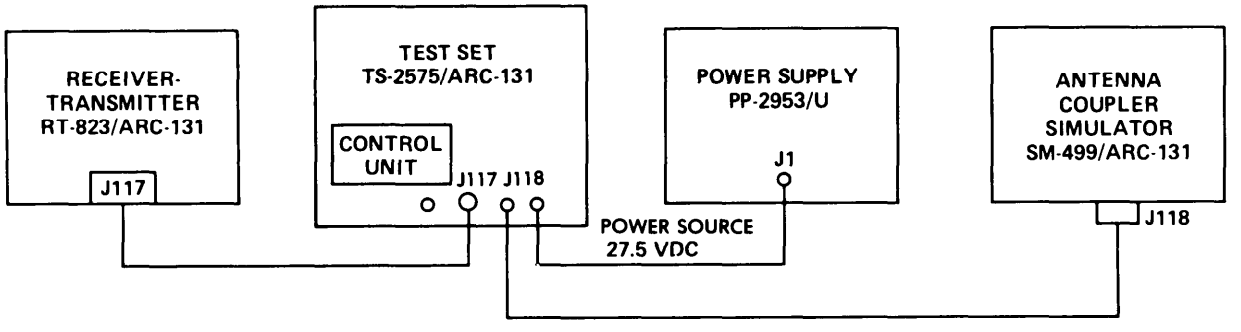
PURPOSE

This test checks for proper operation of the control unit's squelch functions. The test also includes a check of the calibration between the control unit frequency selectors and gearbox assembly indicators.

TEST EQUIPMENT AND MATERIALS

Maintenance Kit MK-1035/ARC-131
Receiver-Transmitter, Radio RT-823/ARC-131
Antenna Coupler Simulator SM-499/ARC-131
Power Supply PP-2953/U
All cables ore part of MK-1035/ARC
TEST SETUP

Connect equipment as shown in test setup diagram. Replace control unit in test set with control unit under test. Turn on all equipment and allow at least 5 minutes for warmup.



EL1AT156

INITIAL EQUIPMENT CONTROL SETTINGS

Set equipment controls as indicated in the following table.

CONTROL AND SWITCH SETTINGS

EQUIPMENT	CONTROL OR SWITCH	POSITION/SETTING
TS-2575/ARC-131	+28 VDC ON-OFF switch TRANSMIT switch	ON OFF
C-7088/ARC-131	MODE SWITCH FREQ sel	T/R 30.95 MHz

2-21. SQUELCH SWITCH AND FREQUENCY SELECTION TEST. (CONT)

TEST PROCEDURE

1. Set control unit SQUELCH switch under test to CARR.
2. Rotate receiver-transmitter SQ ADJ control fully counterclockwise.

STANDARD. Presence of noise in speaker.

3. If no noise is present, see troubleshooting chart 2-24, item 5.
4. Rotate SQ ADJ fully clockwise.

STANDARD. Absence of noise in speaker.

5. If noise is present in speaker, see troubleshooting chart 2-24, item 5.
6. Set control unit SQUELCH switch under test to DIS.

STANDARD. Presence of noise in speaker.

7. If noise is not present, see troubleshooting chart 2-24, item 6.
8. Rotate SQ ADJ control fully counterclockwise.

STANDARD. Presence of noise in speaker.

9. If noise is not present, see troubleshooting chart 2-24, item 6.
10. Set control unit SQUELCH switch under test fully clockwise (TONE).

STANDARD. Absence of noise in speaker.

11. If noise is present in speaker, see troubleshooting chart 2-24, item 5.

NOTE

Reset SQ ADJ control by placing SQUELCH switch on the control unit to CARR and rotating SQ ADJ clockwise from a fully counterclockwise position to a point just beyond the point where squelch-break occurs.

12. Set control unit SQUELCH switch under test to DIS.
13. Decrease frequency setting of control unit from 30.95 MHz to 30.00 MHz in 0.05 MHz steps.

STANDARD. The kHz indicator on gearbox assembly should correspond to last two digits of selected frequency. Antenna coupler simulator should not run.

2-21. SQUELCH SWITCH AND FREQUENCY SELECTION TEST. (CONT)

14. If kHz indicator on gearbox assembly does not correspond to last two digits of selected frequency, see troubleshooting chart 2-24, item 7.
15. Increase frequency setting of control unit from 30.00 MHz to 52.00 MHz in 1 MHz steps.

STANDARD. The MHz indicator on gearbox assembly should correspond to frequency selected at control unit. Antenna coupler simulator should also indicate the tens and units digits selected.

16. If the performance of step 15 does not meet the standard, see troubleshooting chart 2-24, item 8.

NOTE

The lamp on antenna coupler simulator should light for frequencies between 30 MHz and 40 MHz (BAND A). At 49 MHz (BAND B), the green lamp should light and remain lit. If trouble occurs, see troubleshooting chart 2-24, item 8.

17. Set control unit frequency selectors to 53.00 MHz.

STANDARD. Band switch on gearbox assembly operates, MHz indicator at 53.00 MHz, antenna coupler simulator indicates 53.00 MHz.

18. If trouble exists, see troubleshooting chart 2-24, items 9 and 10.
19. Set control unit MODE SWITCH to OFF.
20. Set control unit frequency selectors to 70.00 MHz.
21. Set control unit MODE SWITCH to T/R.
22. Increase the frequency setting of control unit from 70.00 MHz to 75.00 MHz in 1 MHz steps.

STANDARD. The MHz indicator on box corresponds to selected frequency. Antenna coupler simulator does not run.

23. If the performance of step 21 does not meet the standard, see troubleshooting chart 2-24, item 8.

2-22. RETRANSMIT RECEIVE TEST.

PURPOSE

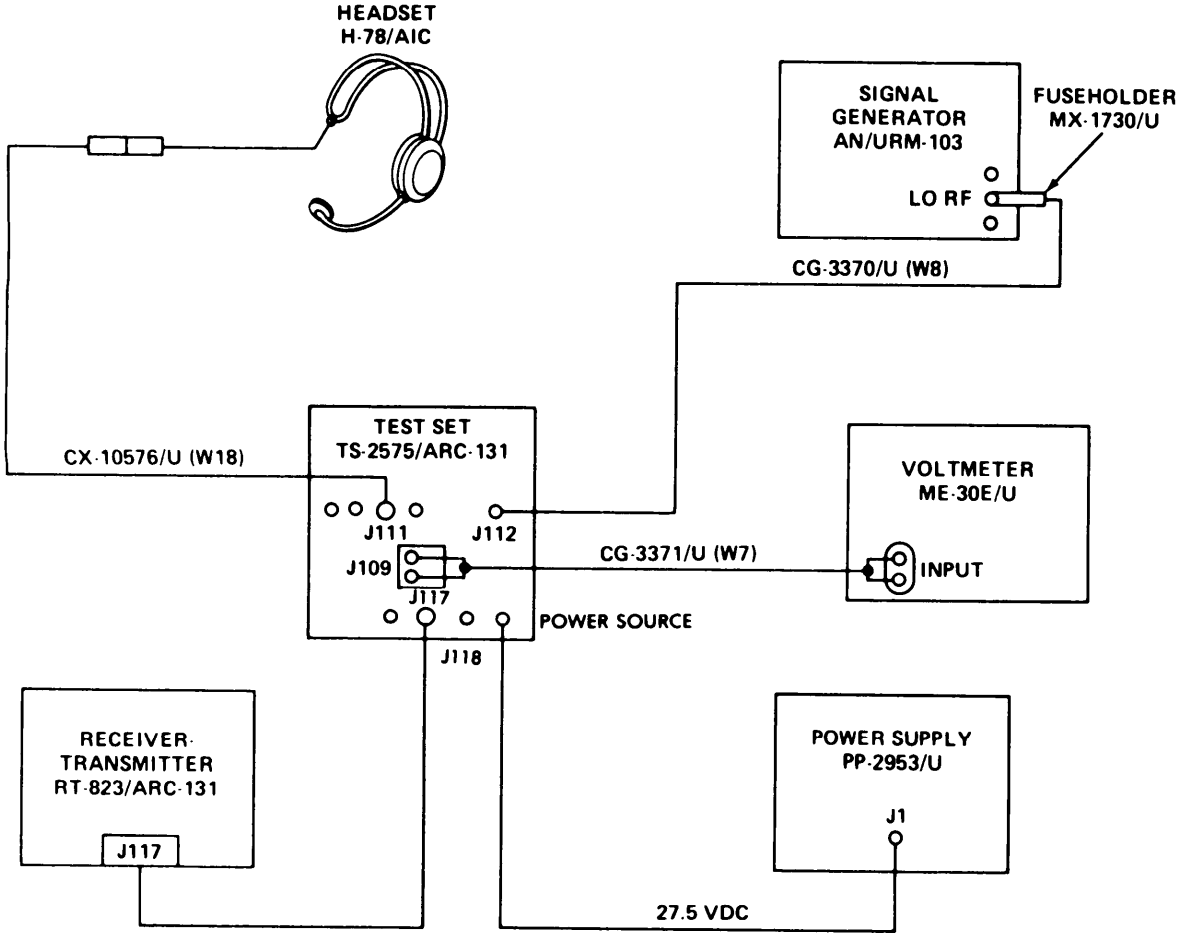
This test checks the rt and control unit when the radio set is receiving rf in the retransmit mode.

TEST EQUIPMENT AND MATERIALS

Maintenance Kit MK-1035/ARC-131
Signal Generator AN/URM-103
Receiver-Transmitter, Radio RT-823/ARC-131
Headset/Microphone H-78/AIC
Electronic Voltmeter ME-30E/U
All cables are part of MK-1035/ARC
Fuseholder MX-1730/U
Power Supply PP-2953/U

TEST SETUP

Connect equipment as shown in test setup diagram. Turn on all equipment and allow at least 5 minutes for warmup.



EL1AT157

2-22. RETRANSMIT RECEIVE TEST. (CONT)

INITIAL EQUIPMENT CONTROL SETTINGS

Set equipment controls as indicated in the following table.

CONTROL AND SWITCH SETTINGS

EQUIPMENT	CONTROL OR SWITCH	POSITION/SETTING
TS-2575/ARC-131	+28 VDC ON-OFF WIDEBAND-NAR BAND TRANSMIT switch	ON NAR BAND OFF
C-1611 D/AIC	VOL	Midrange position
ME-30E/U	Selector switch RANGE	AC 3V
C-7088/ARC-131	MODE SWITCH FREQ sel SQUELCH VOL	RETRAN 40.50 MHz CARR Midrange position
AN/URM-103	BAND SWITCH and RF TUNING control FUNCTION switch RF OUTPUT switch LO-HI RF SET to LINE control and LO RF UV control DEVIATION RANGE KHZ switch DEVIATION control	Adjust to 40.50 MHz. 1000 Hz LO 0-10 KUV Adjust for 0.8 microvolt out. 10 Adjust for 8 kHz deviation.

TEST PROCEDURE

1. Observe that test set RETRANSMIT RCVR lamp is on when AN/URM-103 is adjusted for 0.8 microvolt output.

STANDARD. RETRANSMIT RCVR lamp is on.

2. If lamp is not on, refer radio set to higher level of maintenance.
3. Adjust the LO RF UV control on the AN/URM-103 for minimum output signal.

STANDARD. RETRANSMIT RCVR lamp is off.

4. If lamp is on, refer radio set to higher level of maintenance.
5. Adjust the AN/URM-103 output for 0.8 microvolt.

STANDARD. RETRANSMIT RCVR lamp is on. ME-30E/U indicates 2.8 vrms output at J109 on the test set and a 1000 Hz tone should be heard in headset.

6. If performance of step 5 does not meet the standard, refer radio set to higher level of maintenance.

2-23. RETRANSMIT TRANSMIT TEST.

PURPOSE

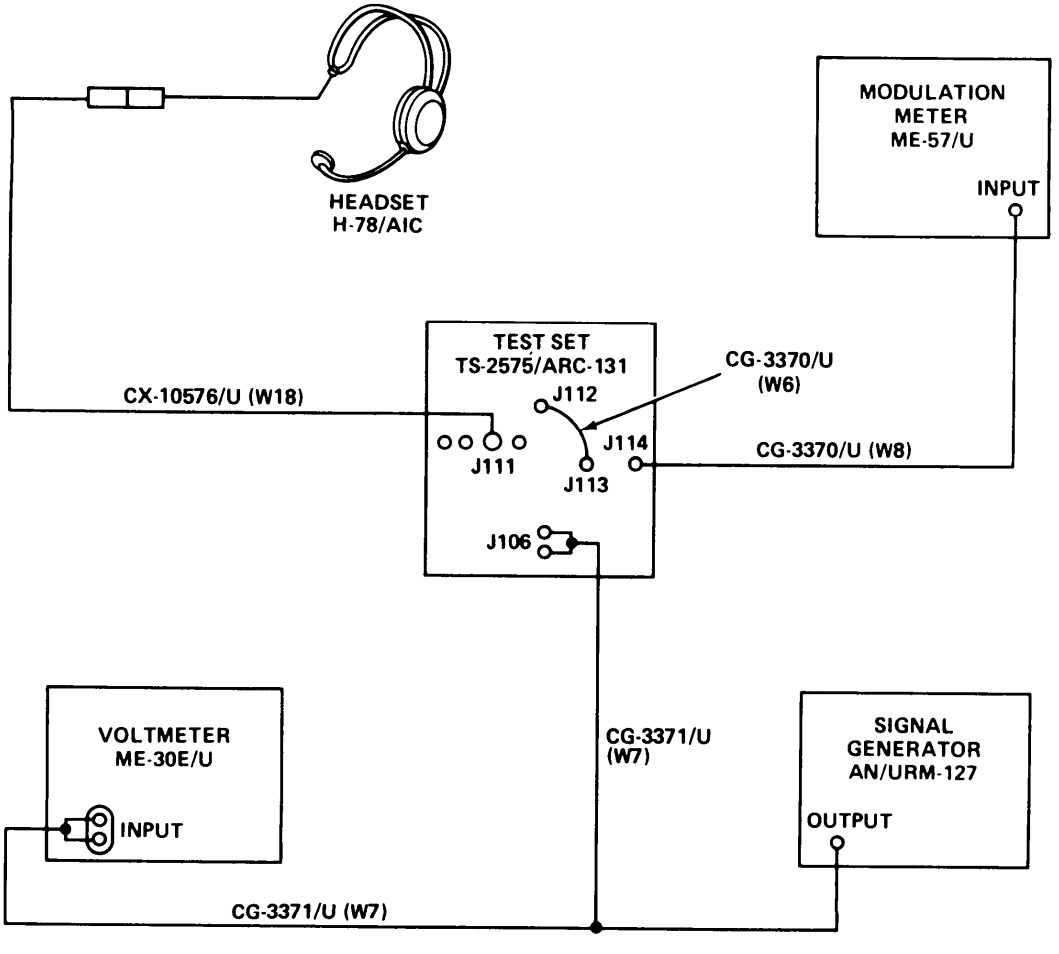
This test checks the rt and control unit when the radio set is transmitting rf in the retransmit mode.

TEST EQUIPMENT AND MATERIALS

Maintenance Kit MK-1035/ARC-131
Modulation Meter ME-57/U
Electronic Voltmeter ME-30E/U
Signal Generator AN/URM-127
Headset/Microphone H-78/AIC
All cables are part of MK-1035/ARC

TEST SETUP

Connect equipment as shown in test setup diagram. Turn on equipment and allow at least 5 minutes for warmup.



EL1AT158

2-23. RETRANSMIT TRANSMIT TEST. (CONT)

INITIAL EQUIPMENT CONTROL SETTINGS

Set equipment controls as indicated in the following table.

CONTROL AND SWITCH SETTINGS

EQUIPMENT	CONTROL OR SWITCH	POSITION/SETTING
TS-2575/ARC-131	+28 VDC ON-OFF WIDEBAND-NAR BAND TRANSMIT switch HI-LO switch	ON NAR BAND OFF LO
C-1611 D/AIC	VOL	Midrange position
ME-30E/U	Selector switch RANGE	AC 3V
ME-57/U	TUNING DEVIATION RANGE - KC FREQUENCY RANGE – MC Selector switch	60.50 MHz KC 20 55 – 120 TUNE
AN/URM-127	Freq dial FREQ RANGE MULTIPLIER OUTPUT CONTROL	10 X 100 Adjust as instructed in procedure.

TEST PROCEDURE

1. Adjust output of AN/U RM-127 for 2.8 vrms as indicated on ME-30E/U meter.
2. Press test set RETRANSMIT SIMULATE switch.

STANDARD. ME-57/U deviation meter should indicate 8 kHz deviation and a 1000 Hz sidetone signal should be audible in headset.

3. If performance of step 2 does not meet the standard, refer radio set to higher level of maintenance.

Section III TROUBLESHOOTING

Subject	Para	Page
General	2-24	2-50
How to Use the Troubleshooting Charts	2-25	2-53
Troubleshooting Charts	2-26	2-54
Receiver-Transmitter Inoperative:		
Voltage Distribution Troubleshooting	2-26	2-56
+ 27.5 VDC Circuit Troubleshooting	2-26	2-61
+ 24 VDC Regulated Circuit Troubleshooting	2-26	2-64
+ 16 VDC Circuit Troubleshooting	2-26	2-68
Receive Mode:		
No Audio Output Troubleshooting	2-26	2-72
Audio Power Troubleshooting	2-26	2-80
Audio Distortion Troubleshooting	2-26	2-81
Poor Audio Response Troubleshooting	2-26	2-83
Poor Sensitivity Troubleshooting	2-26	2-85
Maximum Signal Plus Noise-to-Noise Ratio Troubleshooting	2-26	2-87
Carrier Squelch Sensitivity Troubleshooting	2-26	2-88
Tone Squelch Sensitivity Troubleshooting	2-26	2-89
Transmit Mode:		
Transmitter Power Output (Hi) Troubleshooting	2-26	2-91
Transmitter Power Output (LO) Troubleshooting	2-26	2-94
Transmitter Tone Modulation Troubleshooting	2-26	
Transmitter Deviation Narrow Band Troubleshooting	2-26	2-97
Transmitter Distortion Narrow Band Troubleshooting	2-26	2-99
Maximum Signal Plus Noise-to-Noise Ratio Troubleshooting	2-26	2-101
Transmitter Frequency Stability Troubleshooting	2-26	2-103
Automatic Frequency Selection and Channel Changing Tone Troubleshooting	2-26	2-108
Transmitter Sidetone Troubleshooting	2-26	2-109
Homing Mode:		
Homing Flag Indication Troubleshooting	2-26	2-110
Homing Needle Indication Troubleshooting	2-26	2-111
Control Unit Troubleshooting	2-26	2-114

2-24. GENERAL.

This section contains troubleshooting charts which will help you diagnose failures in the radio set. The troubleshooting charts are designed to isolate faults in response to specific performance problems noted during performance testing in section II of this chapter.

There are two basic kinds of troubleshooting provided: total failure due to interruption of supplied voltages or a primary power short circuit, and performance degradation or failure to perform a specific function in a selected mode of operation.

2-24. GENERAL. (CONT)

OVERALL TROUBLESHOOTING APPROACH

When a radio set fails to meet a designated standard during a performance test, a reference is made in the test procedure to a specific troubleshooting chart which can then be used to locate the cause of the nonperformance. The results of in-aircraft tests may accompany the radio set when it is forwarded by AVUM maintenance to the AVIM unit and can be used to select an appropriate troubleshooting procedure in the event that saving time is essential. If trouble symptoms are unkown, begin with voltage distribution troubleshooting and proceed until symptoms are known. See applicable mode of operation troubleshooting chart.

Troubleshooting procedures are based on the following assumptions:

1. Only one malfunction exists which is causing the symptom detected.
2. The troubleshooting charts do not isolate every possible defect.
3. Failure to locate a defect using the charts suggests a wiring-related problem which can be isolated using the schematics in the back of this manual.
4. Troubleshooting procedures for germanium and silicon versions of the modules in the rt are the same.

TOTAL FAILURE TROUBLESHOOTING

The rt will be completely inoperative if voltage distribution is interrupted by an open or a short in the rt chassis wiring. The voltage distribution and primary power circuit troubleshooting charts will aid in determining if there is a wiring problem or if power supply has been interrupted by a faulty power supply assembly or its fuse, a faulty voltage regulator, or a defect in the control unit. Perform appropriate repair or replacement as instructed and repeat the performance test after repair is made.

PERFORMANCE FAILURE TROUBLESHOOTING

If the rt is operational, but does not meet a performance standard, performance troubleshooting charts will aid in determining the specific module or component that is malfunctioning. Performance troubleshooting isolates problems when the radio components are functioning in the receive mode, the transmit mode, or its homing mode. In each case, the first chart covers a gross failure; for example, a complete failure to transmit. Subsequent charts cover performance degradation where the rt may transmit, for example, but at low power or with excess distortion. The troubleshooting charts isolate the problem to a module or component that is faulty. A faulty module may have failed completely or partially, may be operating at less than standard performance due to damage or age, or may itself contain an open or short. Repair or replacement instructions for a specific module or component is given. After repair or replacement, aline unit if required, then repeat performance test.

2-24. GENERAL. (CONT)

Troubleshooting procedures in this section make use of TMDE and Maintenance Kit, Electronic Equipment MK-1035/ARC-131. Specific test arrangements are given for each procedure. A preliminary status condition for the maintenance kit is set up and then changed as required to perform troubleshooting procedures.

Complete descriptive data and instructions for operating the maintenance kit are given in TM 11-6625-1610-12. Instructions for operating the radio set control unit are given in TM 11-5820-670-12.

The function of the transmit button (usually part of the aircraft wiring or of the headset-microphone) is performed by the TRANSMIT switch on the test set (set to MOM or ON position to transmit). An audio amplifier is built into the maintenance kit so that test audio signals may be monitored when a headset is plugged into J111 on the kit. The radio antenna is simulated in the maintenance kit by a dummy load which is connected to the rt output by means of a jumper cable (CG-3370/U (W6)) connected between J112 and J113 on the kit.

Troubleshooting is performed with equipment covers removed and some modules swung open. In some procedures, modules, components, or internal connections are removed. See section V of this chapter for detailed removal and replacement procedures for covers, modules, and chassis-mounted components.

WARNING

Most procedures are performed with power applied to the equipment. To safeguard against electrical shock and possible damage to equipment, remove all jewelry.

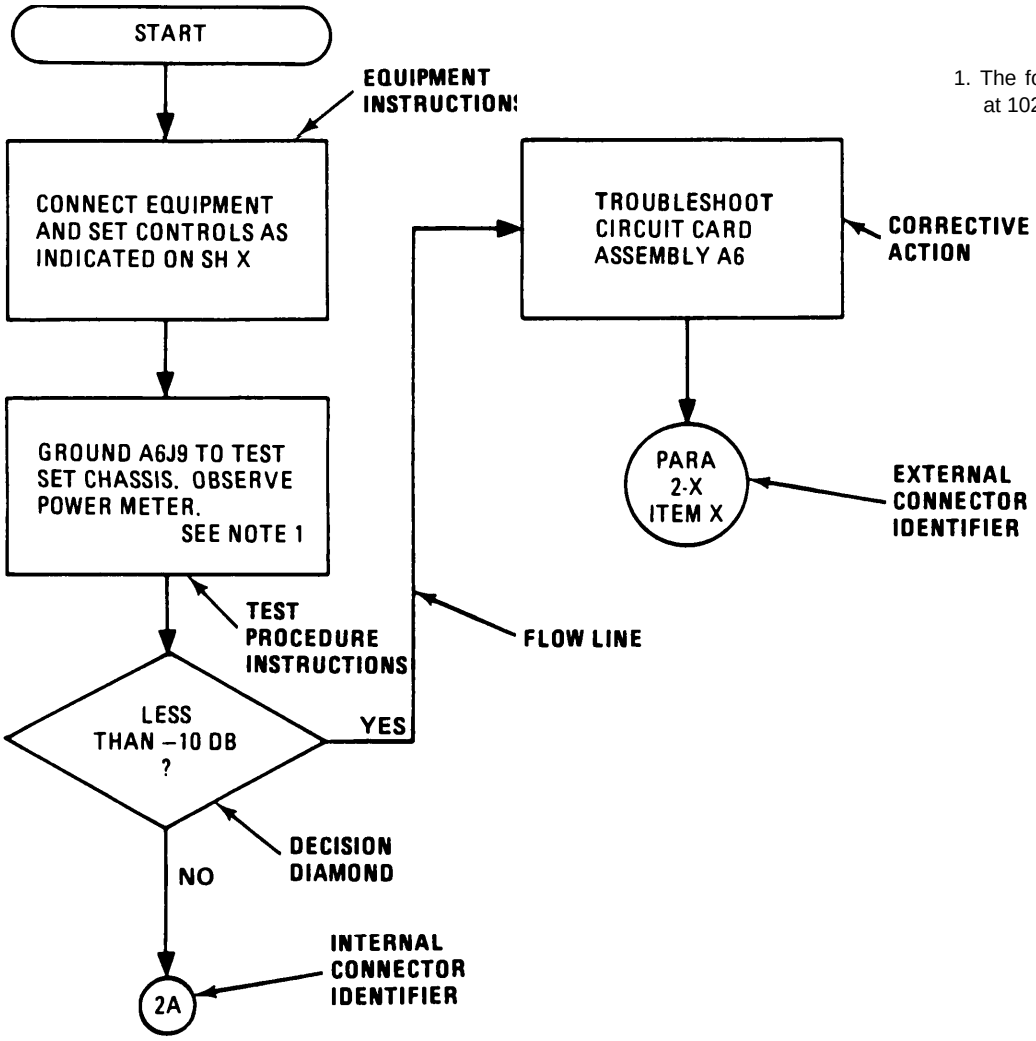
Measurements of resistance between a test point and ground are used to locate shorts in primary power circuits. This is done with power off and the rt completely disconnected from any other equipment. The rt modules are transistorized. Exercise care when taking resistance measurements.

When troubleshooting the rt in the receive mode, it is sometimes necessary to test the response of the rt on a specific module under operational conditions. This can be done on the test bench by generating a simulated received signal and substituting this signal for an actual signal and injecting it at a particular connector pin on test point. When applicable, reference is made to the signal substitution procedure and signal strength and frequency, point of injection, monitor point, and typical indication are given.

NOTE

Make certain to understand how to use the flow charts before attempting to troubleshoot radio set (para 2-25).

2-25. HOW TO USE THE TROUBLESHOOTING CHARTS.



NOTE

1. The following measurement checks distortion at 1020 Hz.

The preceding illustration is an example of a logic flow chart. Refer to the illustration while reading the following information.

START

Each chart has a start segment, indicating the start of the troubleshooting procedure.

TEST PROCEDURE INSTRUCTIONS

Test procedure instructions appear in a rectangular box. These instructions usually contain specific test points to be probed.

DECISION DIAMOND

As a result of a particular test point probe, some electrical value should be observed, such as a voltage indication on a piece of test equipment. The decision diamond defines what value should be observed and permits a YES or NO decision in response to what is observed.

TROUBLESHOOTING FLOW LINE

Troubleshooting flow lines provide direction to successive steps in the logic chart. An arrow at the end of each flow line indicates the next step in the troubleshooting chain.

2-25. HOW TO USE THE TROUBLESHOOTING CHARTS. (CONT)

CORRECTIVE ACTION OR ADDITIONAL INSTRUCTION

A corrective action box or additional instruction box always follows a decision diamond. If a radio set response does not meet the standard set in the decision diamond, the appropriately marked flow line from the decision diamond will usually be followed to a corrective action box. If the radio set response meets the standard, the flow line will be followed to an additional instruction box, which will either continue the troubleshooting procedure or refer to the next test in the sequence.

INTERNAL CONNECTOR IDENTIFIER

There are two sizes of circular identifiers used in the troubleshooting charts. The smaller of the two is the internal connector identifier. The internal connector identifier indicates a continuation of the procedure to another sheet in the same troubleshooting chart. The sheet on which the procedure is continued contains a corresponding identifier; that is, a small circle in which the same number is printed.

The number in the circle indicates on which sheet the test procedure continues. In the sample chart, for example, the NO branch of the decision diamond flows to an identifier containing a 2. This means that the procedure is continued on sheet 2, at the small circle containing 2. If there is more than one connector on a sheet, a letter will be added to the sheet number such as 1A.

EXTERNAL CONNECTOR IDENTIFIER

The external connector is a large circle which references a paragraph outside the troubleshooting chart. In the sample illustration, the large circle contains para 2-x. This paragraph reference identifies the location of the A5 assembly replacement procedure, referred to in the preceding corrective action rectangle. This replacement procedure is not found within the troubleshooting chart. Thus, a large circle always references some information **external** to the flow chart.

NOTES

The third column on each troubleshooting sheet may contain notes used to clarify information contained in the troubleshooting chart.

2-26. TROUBLESHOOTING CHARTS.

Prepare to perform troubleshooting by placing the rt on a test bench and removing the cover (para 2-39). The control unit cover must also be removed when troubleshooting that component (para 2-77, step 1).

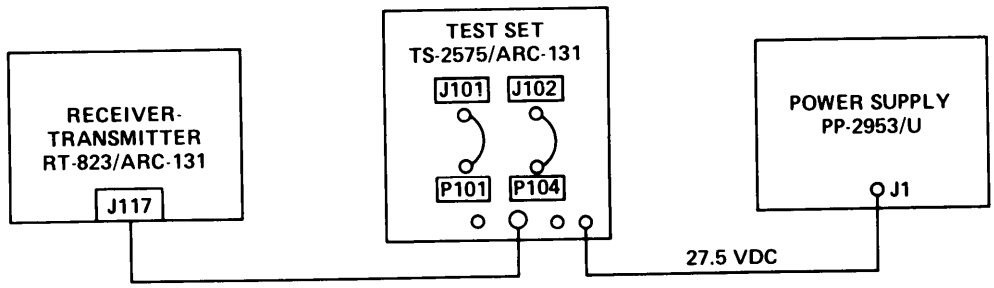
When symptoms reported from operational tests indicate possible primary power troubles or symptoms of trouble are unknown, check the primary power circuits for short circuits. When fault is found, repair the trouble before applying power to the unit.

If symptoms are known as a result of performance tests or by report from AVUM maintenance, perform troubleshooting to locate fault.

Perform preliminary procedure to adjust primary power supply. Then select troubleshooting chart covering trouble symptom indicated by performance tests or by AVUM maintenance and change preliminary procedure equipment setup as required. Then perform troubleshooting. If troubleshooting does not locate cause of malfunction, refer component to next higher level of maintenance.

2-26. TROUBLESHOOTING CHARTS. (CONT)

PRELIMINARY PROCEDURE. Set up equipment as shown in diagram.



NOTE:
[ ] INDICATES EQUIPMENT MARKING

EL1AT159

NOTE

Red covered battery clip on test set power cable connects to + 27.5 vdc power supply outlet. Black covered battery clip connects to ground.

1. Adjust power supply for an output of + 27.5 vdc.
2. Set test set controls as indicated in the following table.

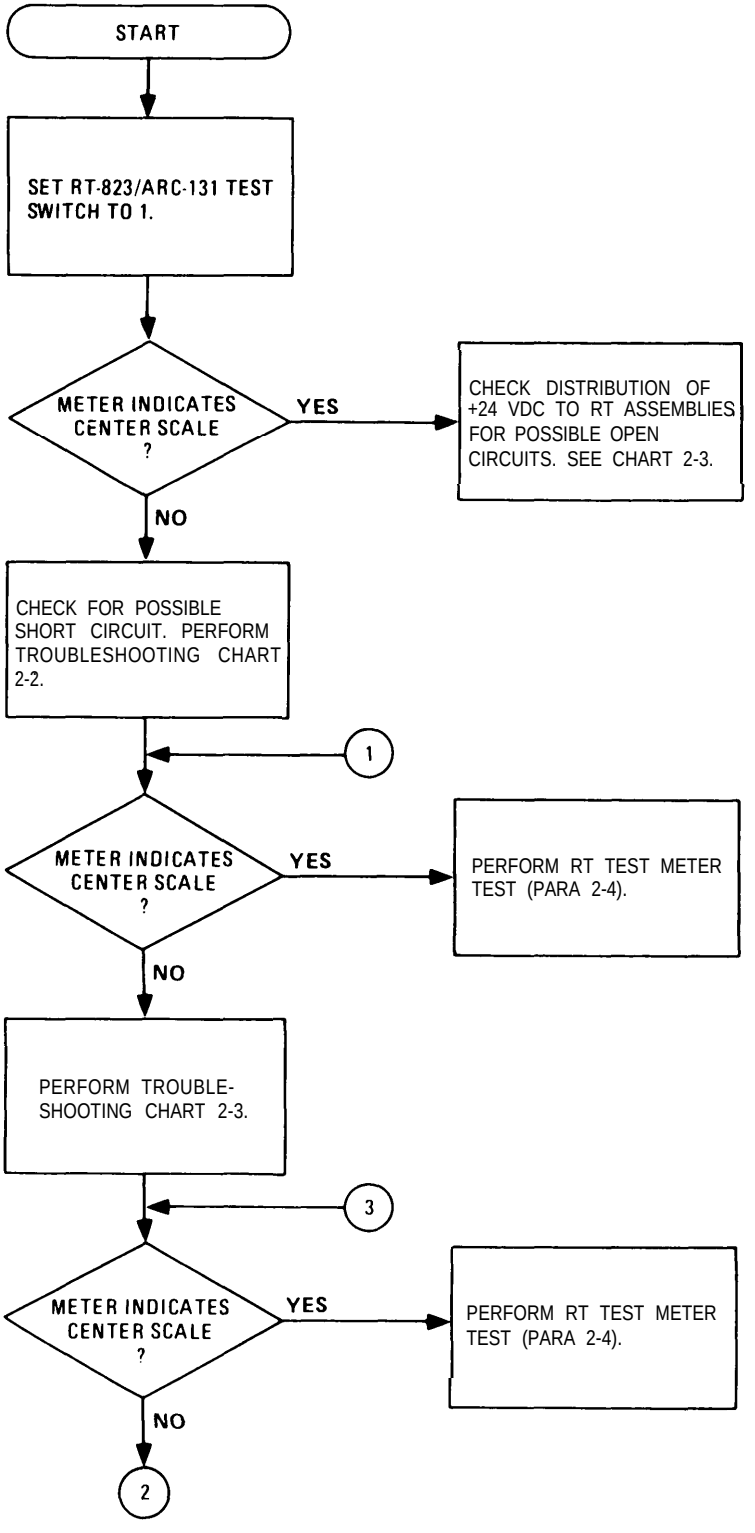
CONTROL AND SWITCH SETTINGS

CONTROL OR SWITCH	POSITION/SETTING
TRANSMIT switch	OFF
PILOT-ON	ON
WIDEBAND – NAR BAND	NAR BAND
RF-AMP ALINE switches	
ON-AGC	ON
HI-LO switch	LO
SQUELCH	DIS
MODE SWITCH	T/R
Transmit-Interphone selector	1
RECEIVER 1	ON
+28 VDC	ON

3. Proceed to Troubleshooting Chart 2-1 or to other troubleshooting charts as directed by performance tests.

2-26. TROUBLESHOOTING CHARTS. (CONT)

CHART 2-1
Voltage Distribution Troubleshooting
(Sheet 1 of 5)

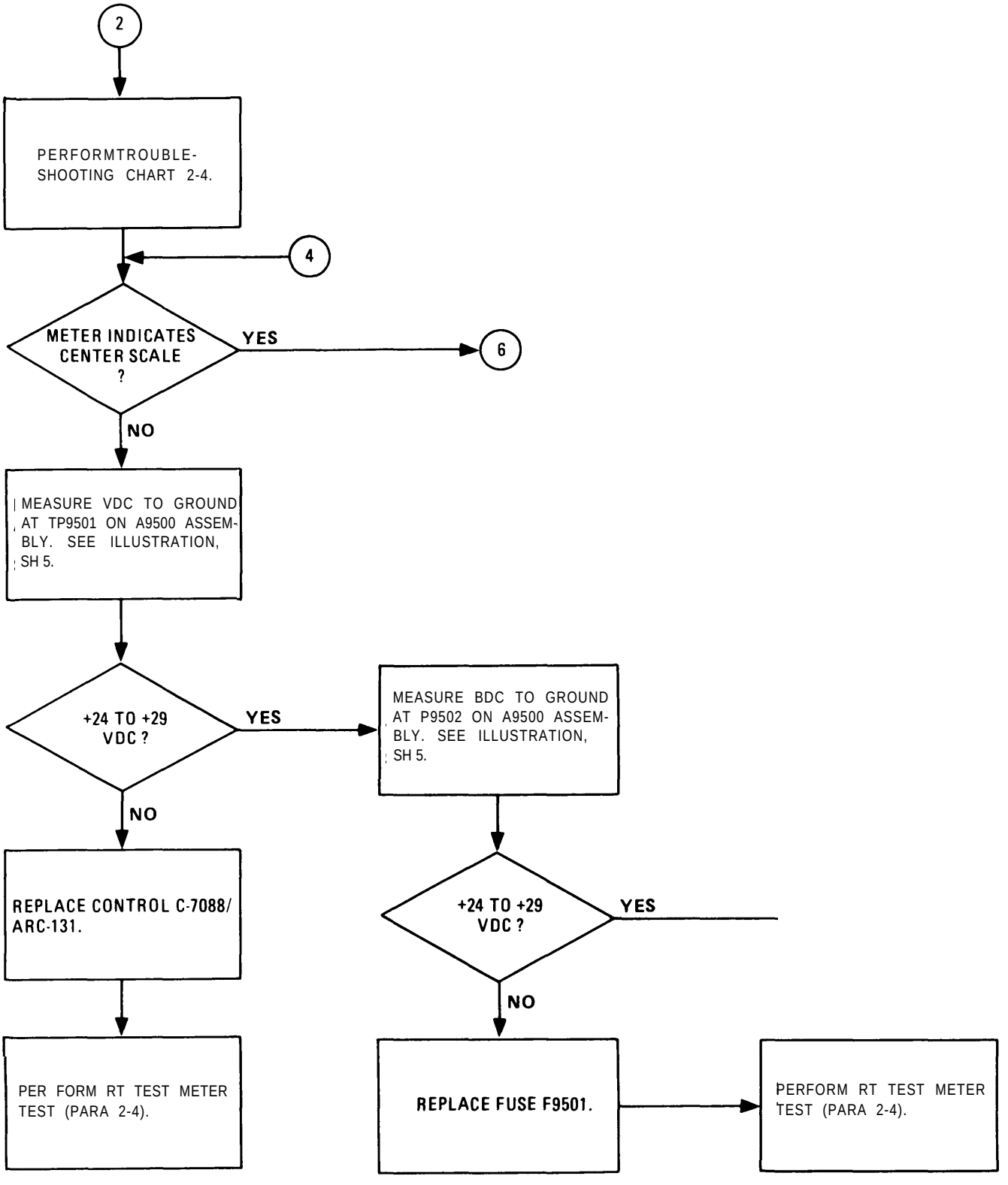


NOTES

1. See FO-11 for primary power distribution.
2. If open circuits are found, refer rt to a higher level of maintenance.

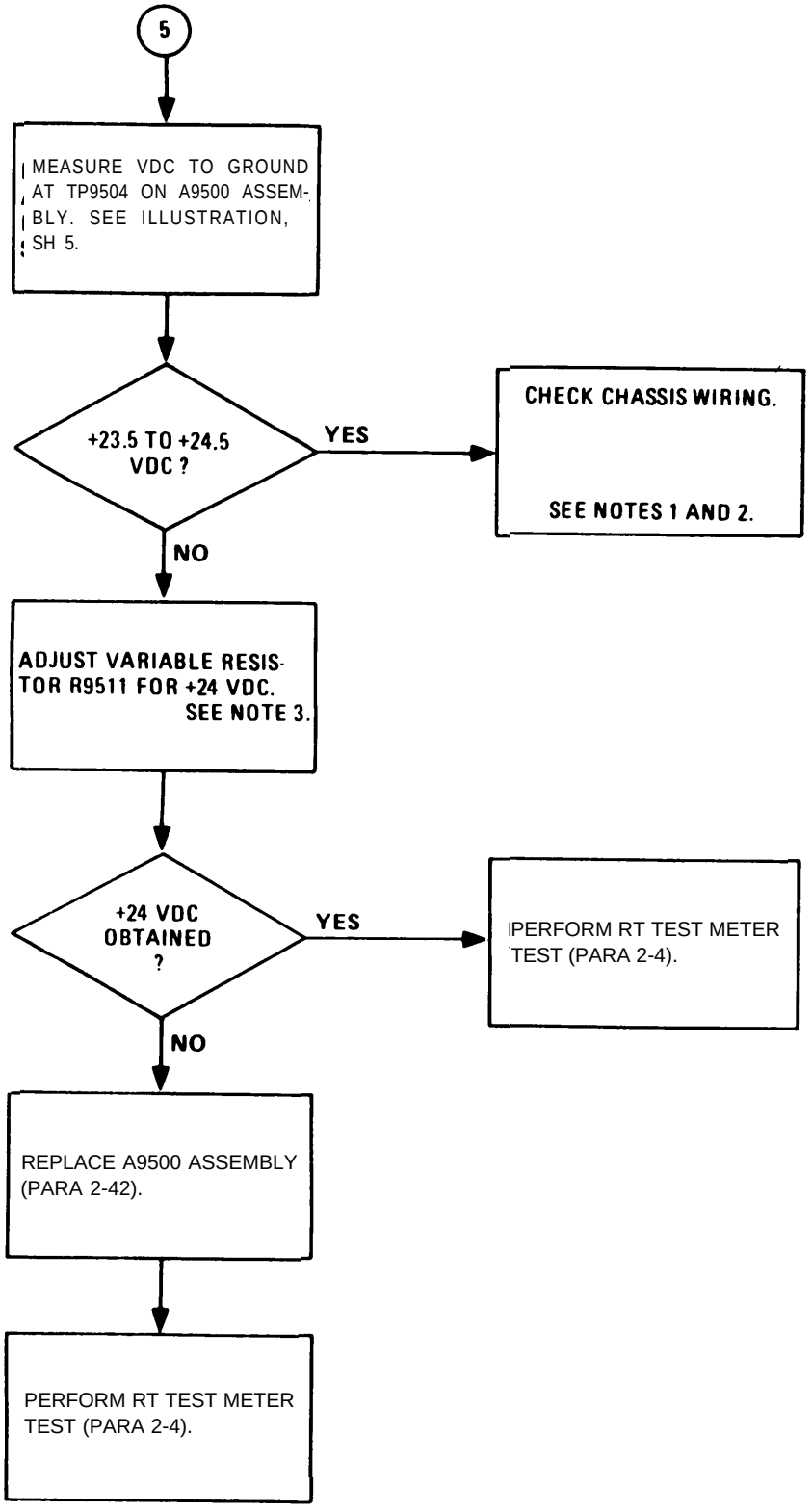
2-26. TROUBLESHOOTING CHARTS. (CONT)

CHART 2-1
Voltage Distribution Troubleshooting
(Sheet 2 of 5)



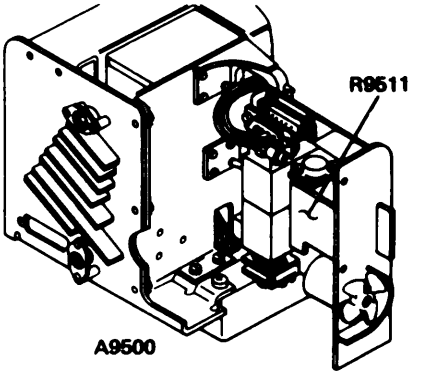
2-26 TROUBLESHOOTING CHARTS. (CONT)

CHART 2-1
Voltage Distribution Troubleshooting
(Sheet 3 of 5)


5
MEASURE VDC TO GROUND AT TP9504 ON A9500 ASSEMBLY. SEE ILLUSTRATION, SH 5.
+23.5 TO +24.5 VDC ?
YES
CHECK CHASSIS WIRING.
SEE NOTES 1 AND 2.
NO
ADJUST VARIABLE RESISTOR R9511 FOR +24 VDC. SEE NOTE 3.
+24 VDC OBTAINED ?
YES
PERFORM RT TEST METER TEST (PARA 2-4).
NO
REPLACE A9500 ASSEMBLY (PARA 2-42).
PERFORM RT TEST METER TEST (PARA 2-4).

NOTES

3. R9511 is located on underside of circuit card on A9500.



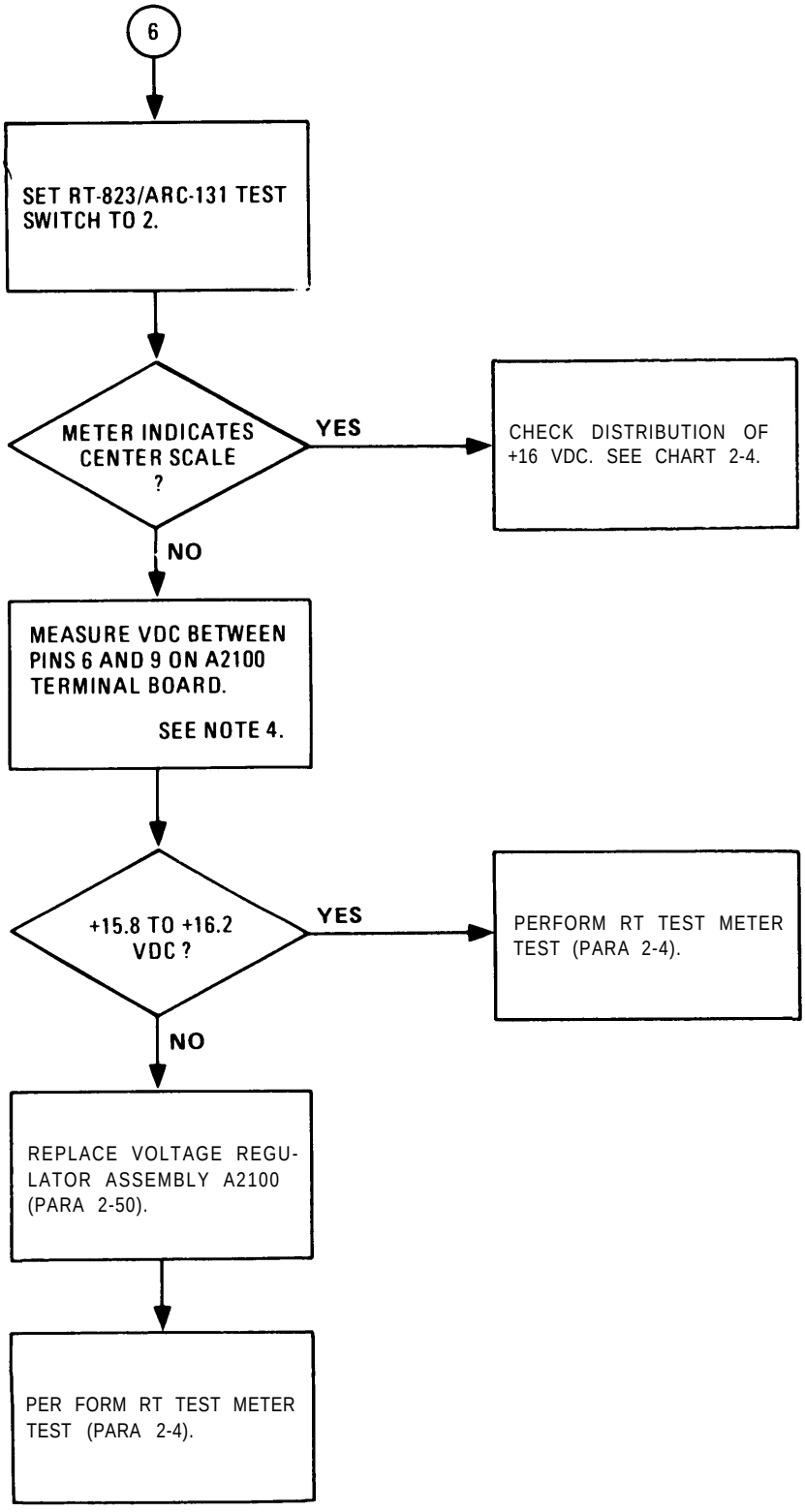
EL1AT175

CAUTION

Be careful not to short out the cord to nearby components while power is applied to A9500.

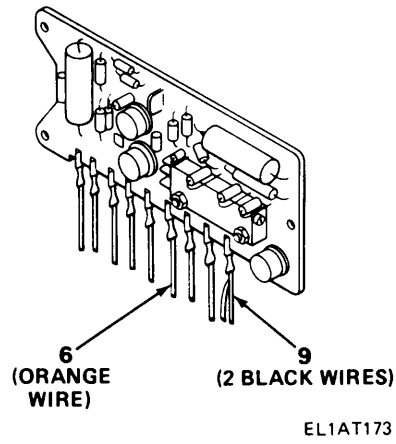
2-26. TROUBLESHOOTING CHARTS. (CONT)

CHART 2-1
Voltage Distribution Troubleshooting
(Sheet 4 of 5)


6
SET RT-823/ARC-131 TEST SWITCH TO 2.
METER INDICATES CENTER SCALE ?
YES
CHECK DISTRIBUTION OF +16 VDC. SEE CHART 2-4.
NO
MEASURE VDC BETWEEN PINS 6 AND 9 ON A2100 TERMINAL BOARD.
SEE NOTE 4.
+15.8 TO +16.2 VDC ?
YES
PERFORM RT TEST METER TEST (PARA 2-4).
NO
REPLACE VOLTAGE REGULATOR ASSEMBLY A2100 (PARA 2-50).
PER FORM RT TEST METER TEST (PARA 2-4).

NOTES

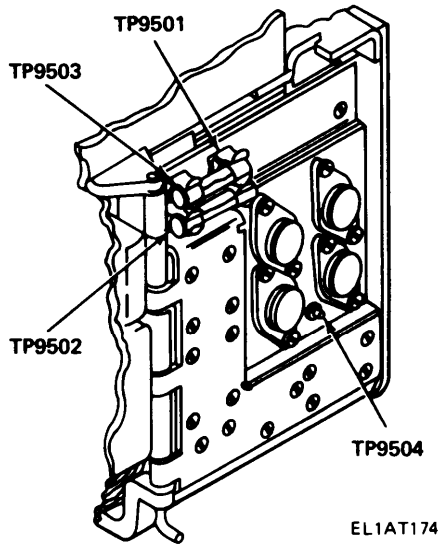
4. A2100 Terminal board.



Connect positive (+) lead of meter to pin 6 and negative (–) lead to pin 9.

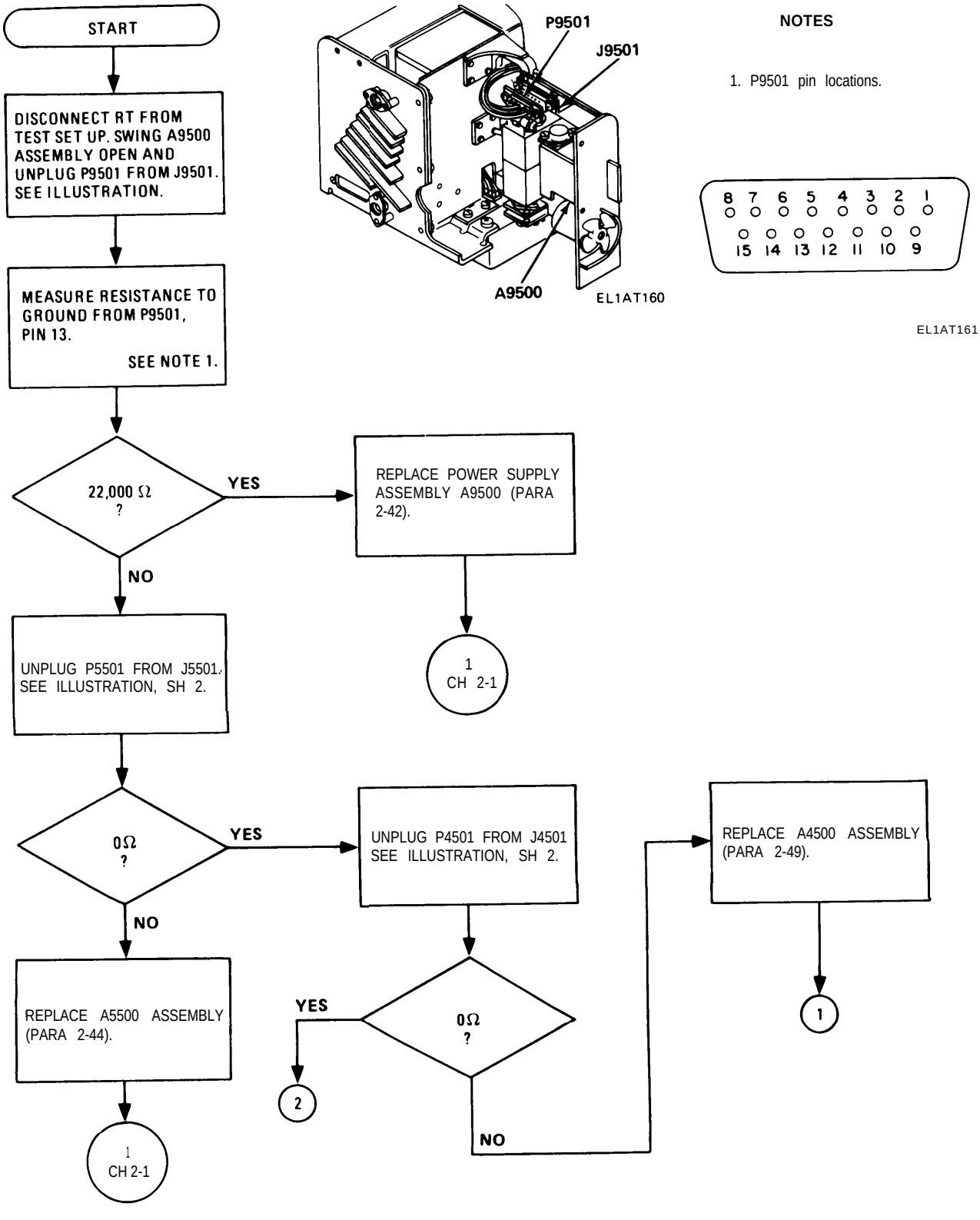
2-26. TROUBLESHOOTING CHARTS. (CONT)

CHART 2-1
Voltage Distribution Troubleshooting
(Sheet 5 of 5)



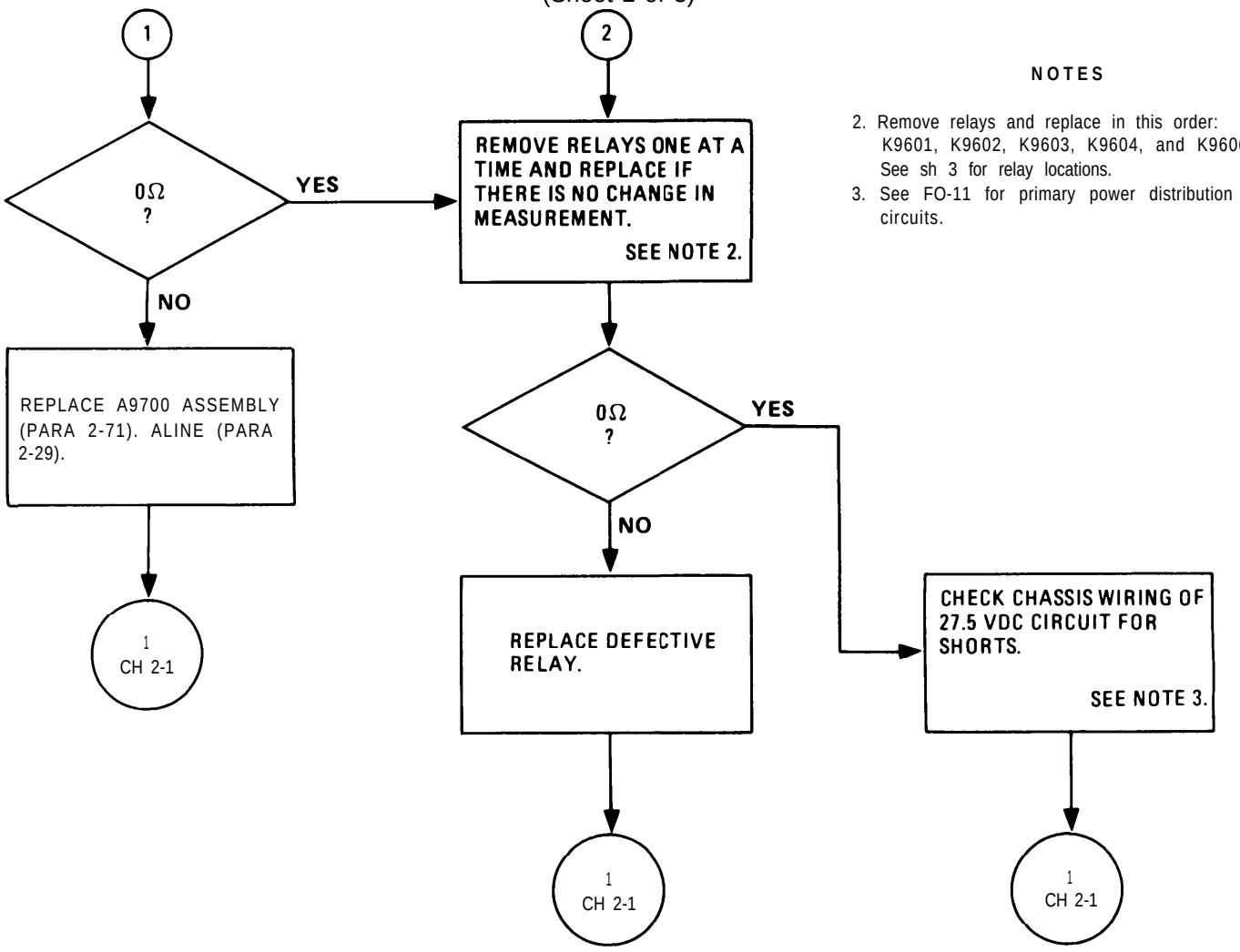
2-26. TROUBLESHOOTING CHARTS. (CONT)

CHART 2-2
+ 27.5 vdc Circuit Troubleshooting
(Sheet 1 of 3)



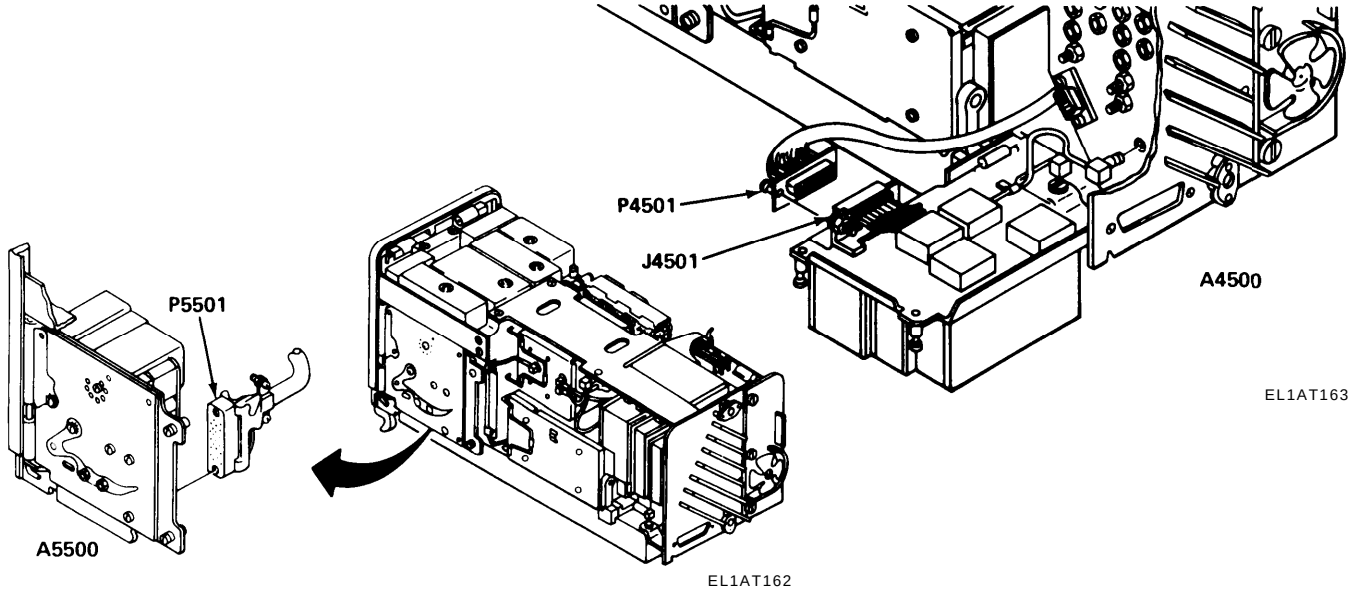
2-26. TROUBLESHOOTING CHARTS. (CONT)

CHART 2-2
+27.5 vdc Circuit Troubleshooting
(Sheet 2 of 3)



NOTES

2. Remove relays and replace in this order: K9601, K9602, K9603, K9604, and K9606. See sh 3 for relay locations.
3. See FO-11 for primary power distribution circuits.

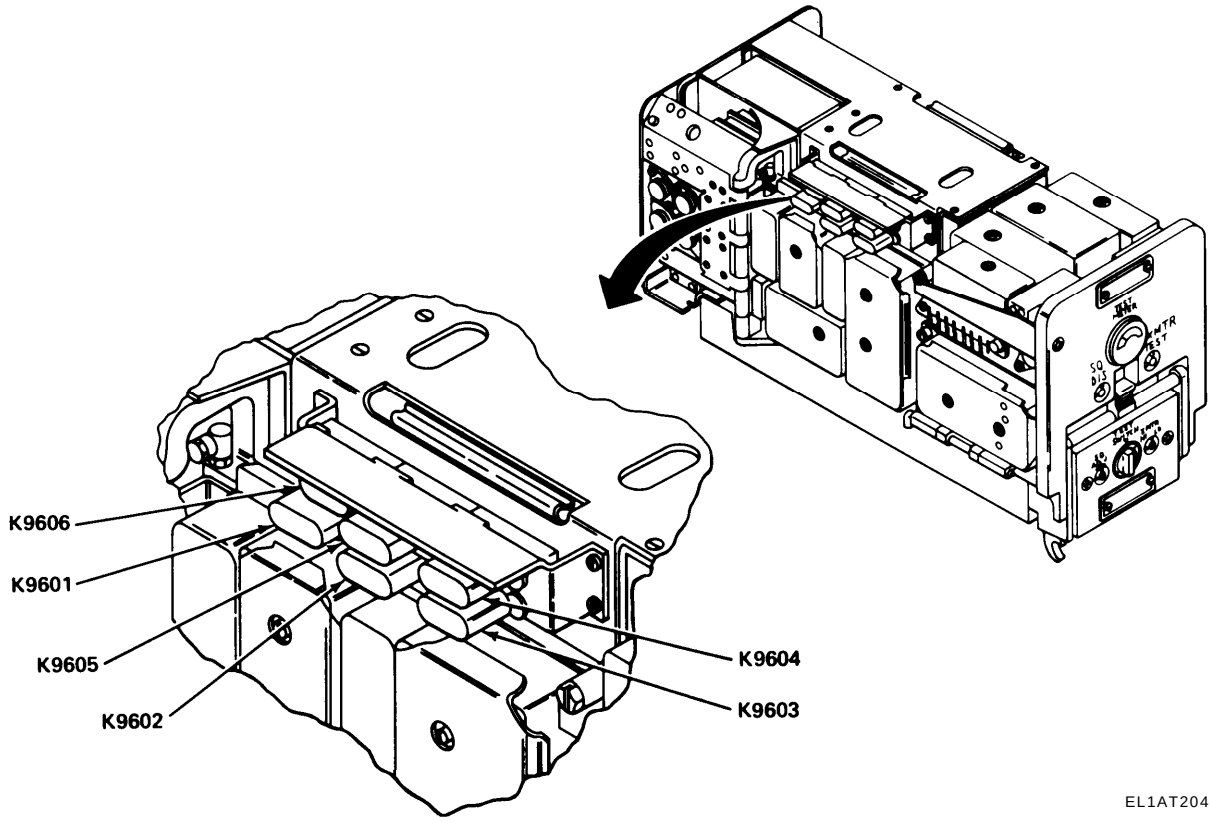


EL1AT163

EL1AT162

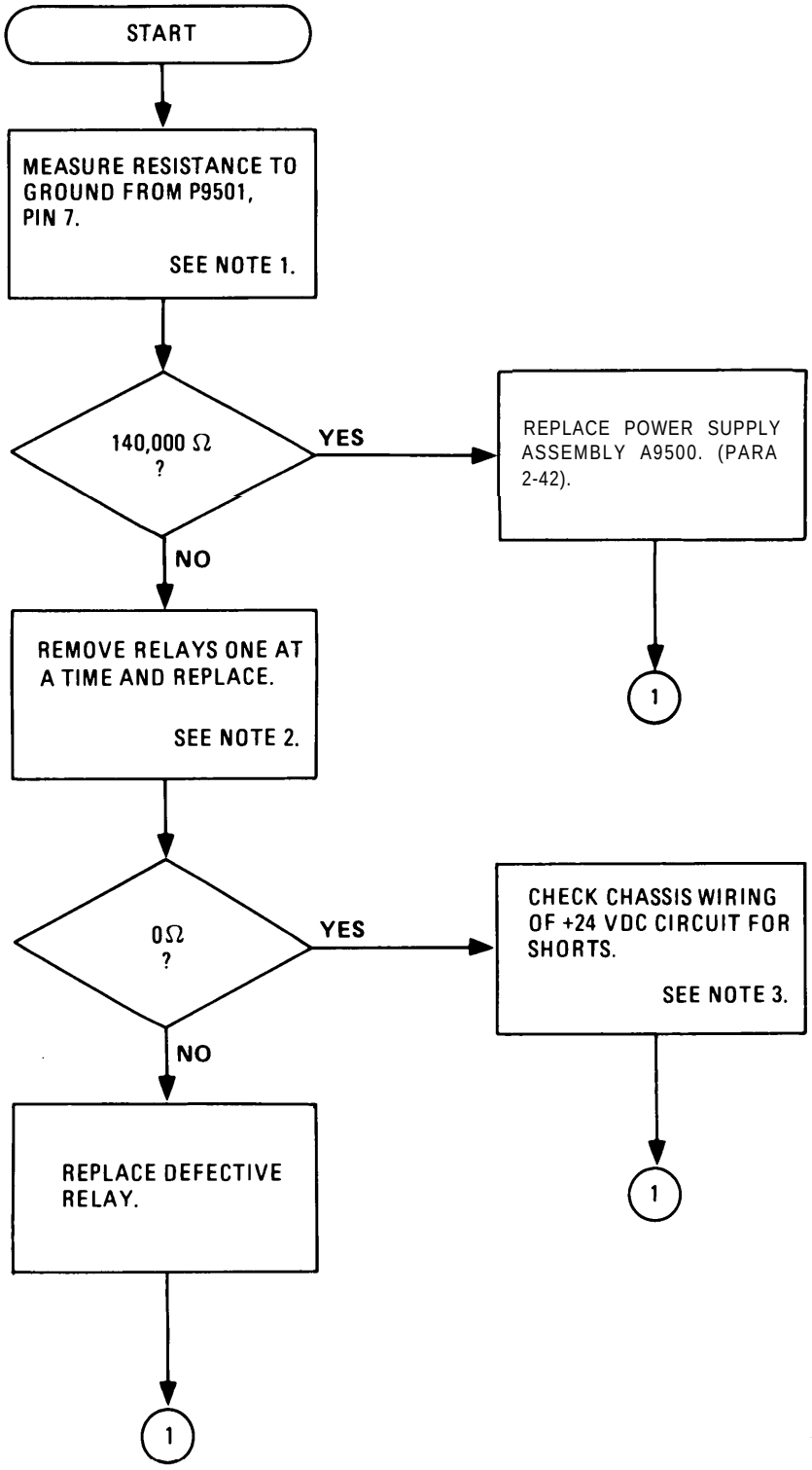
2-26. TROUBLESHOOTING CHARTS. (CONT)

CHART 2-2
+27.5 vdc Circuit Troubleshooting
(Sheet 3 of 3)



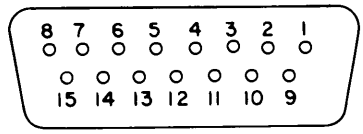
2-26. TROUBLESHOOTING CHARTS. (CONT)

CHART 2-3
+24 vdc Regulated Circuit Troubleshooting
(Sheet 1 of 4)



NOTES

1. P9501 pin locations.

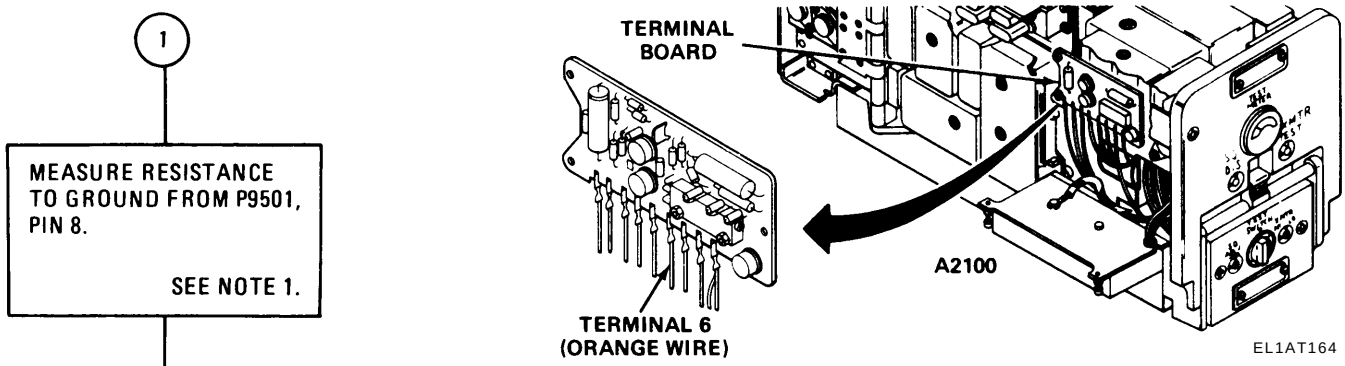


EL1AT161

2. Remove relay and replace in this order: K9601 and K9605. See sh 4 for relay location.
3. See FO-11 for primary power distribution circuits.

2-26. TROUBLESHOOTING CHARTS. (CONT)

CHART 2-3
+24 vdc Regulated Circuit Troubleshooting
(Sheet 2 of 4)



1

MEASURE RESISTANCE TO GROUND FROM P9501, PIN 8.
SEE NOTE 1.

110Ω ?

YES

REPLACE POWER SUPPLY ASSEMBLY A9500. (PARA 2-42).

3 CH 2-1

NO

DISCONNECT P5501.

0Ω ?

YES

DISCONNECT LEAD TO TERMINAL 6 OF VOLTAGE REGULATOR ASSEMBLY A2100. SEE ILLUSTRATION.

0Ω ?

YES

2

NO

REPLACE A2100 ASSEMBLY (PARA 2-50).

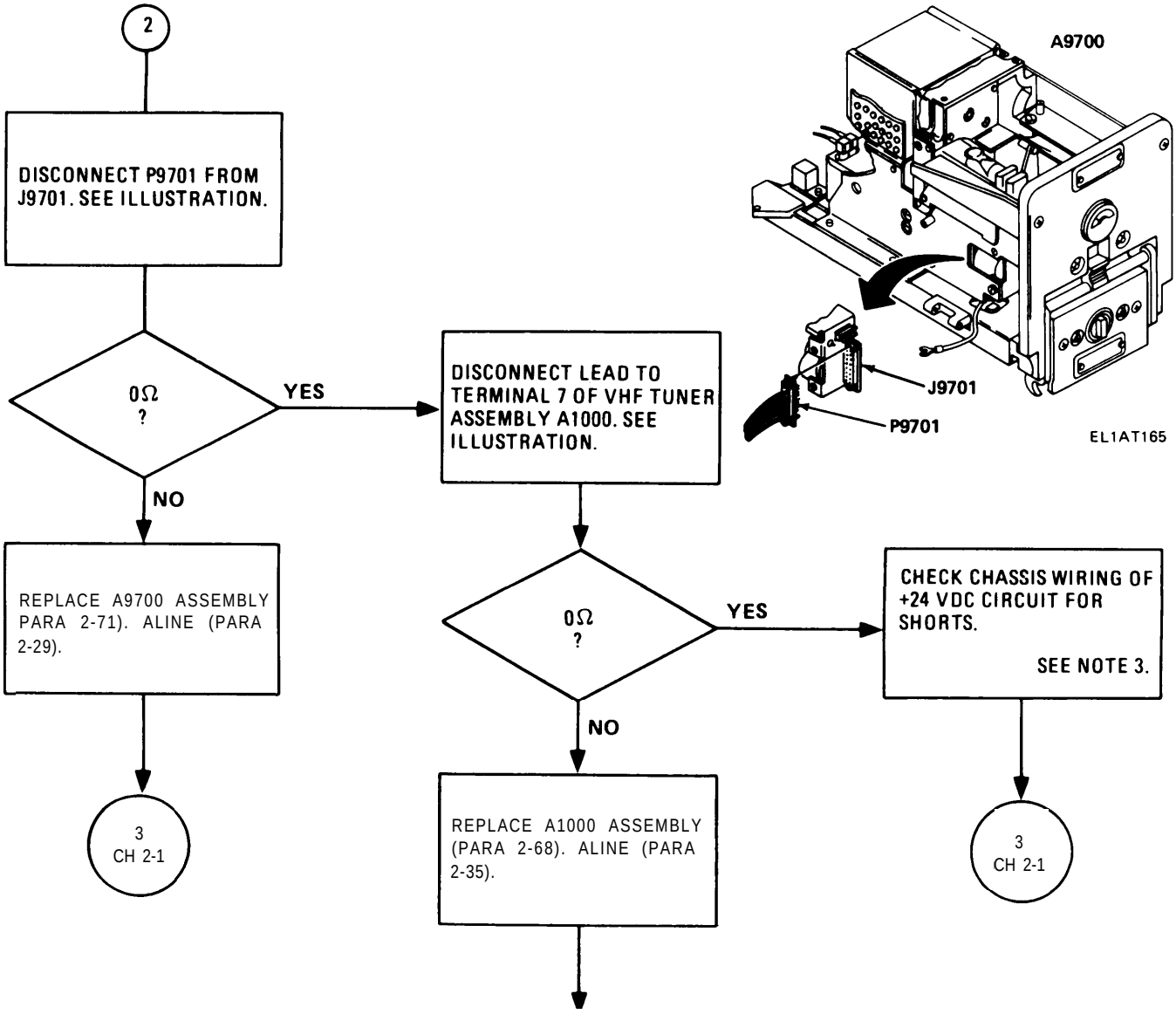
NO

REPLACE A5500 ASSEMBLY (PARA 2-44).

3 CH 2-1

2-26. TROUBLESHOOTING CHARTS. (CONT)

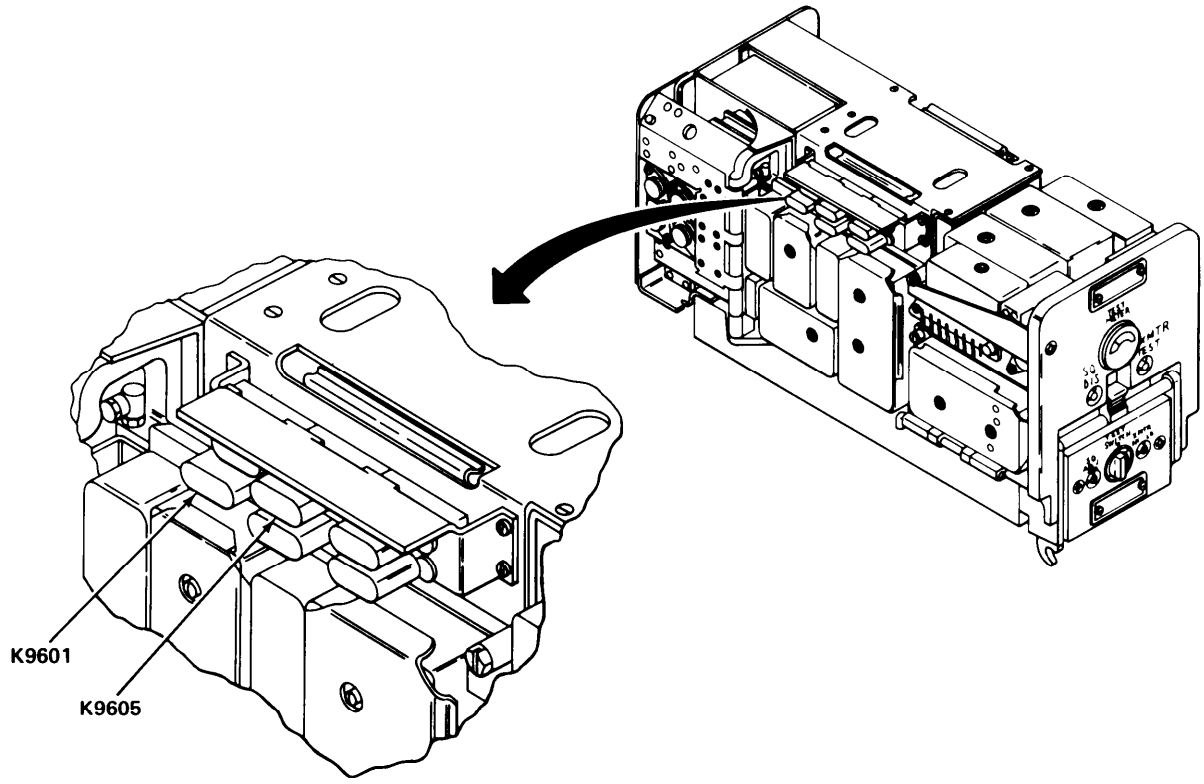
CHART 2-3
+24 vdc Regulated Circuit Troubleshooting
(Sheet 3 of 4)



EL1AT166

2-26. TROUBLESHOOTING CHARTS. (CONT)

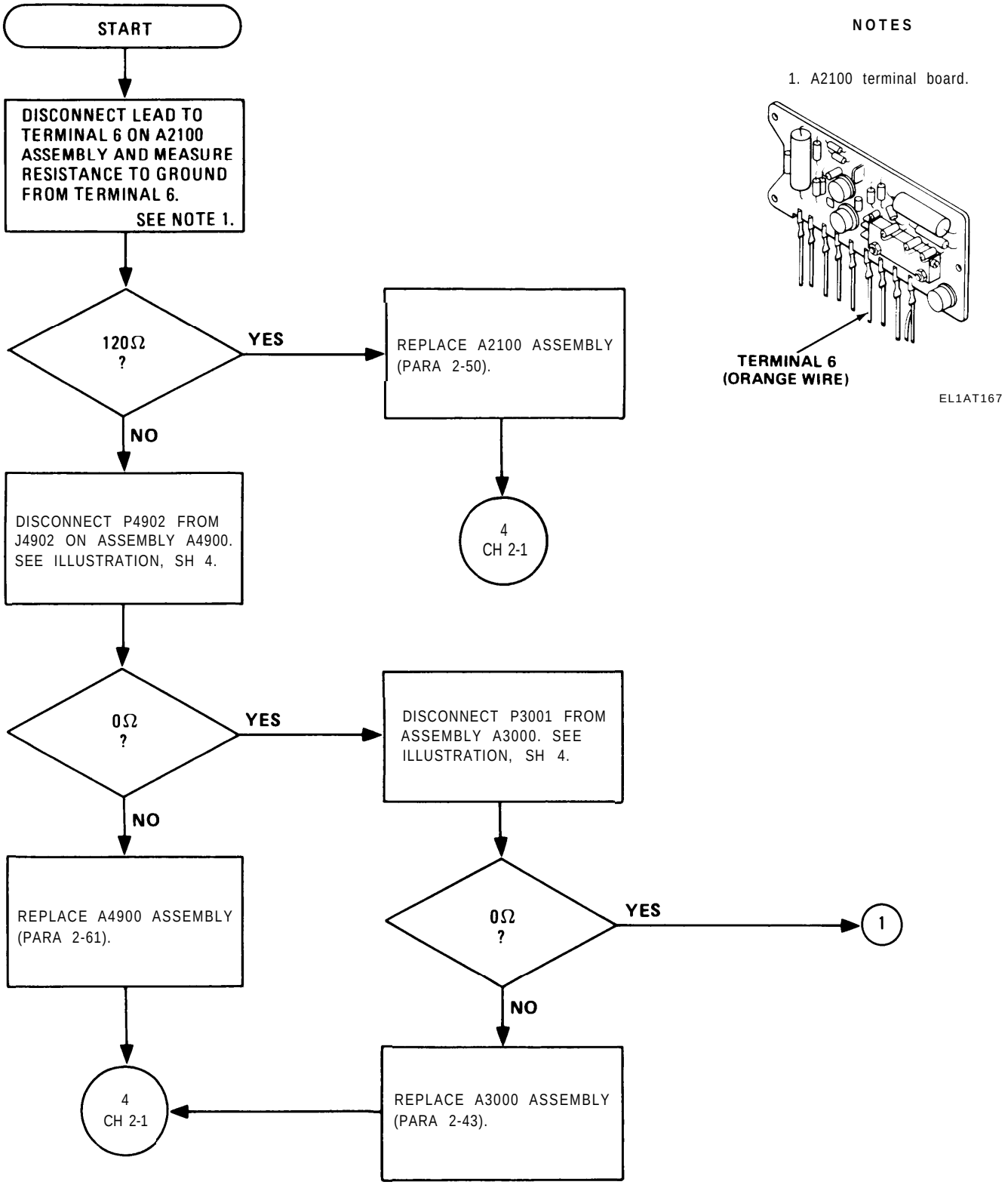
CHART 2-3
+24 vdc Regulated Circuit Troubleshooting
(Sheet 4 of 4)



EL1AT205

2-26. TROUBLESHOOTING CHARTS. (CONT)

CHART 2-4
+ 16 vdc Circuit Troubleshooting
(Sheet 1 of 4)



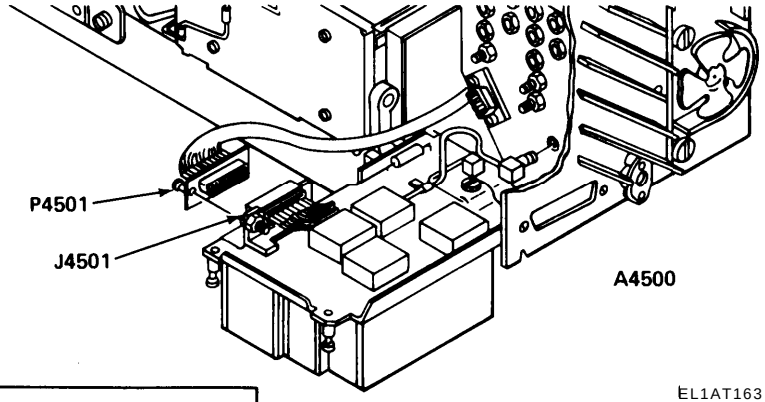
NOTES

1. A2100 terminal board.

EL1AT167

2-26. TROUBLESHOOTING CHARTS. (CONT)

CHART 2-4
+ 16 vdc Circuit Troubleshooting
(Sheet 2 of 4)



EL1AT163

1

DISCONNECT P5501. SEE ILLUSTRATION.

0Ω ?

YES

DISCONNECT P4501. SEE ILLUSTRATION.

NO

REPLACE A5500 ASSEMBLY (PARA 2-44).

0Ω ?

YES

DISCONNECT P2001 FROM J2001. SEE ILLUSTRATION, SH 4.

NO

4 CH 2-1

REPLACE A4500 ASSEMBLY (PARA 2-49).

YES

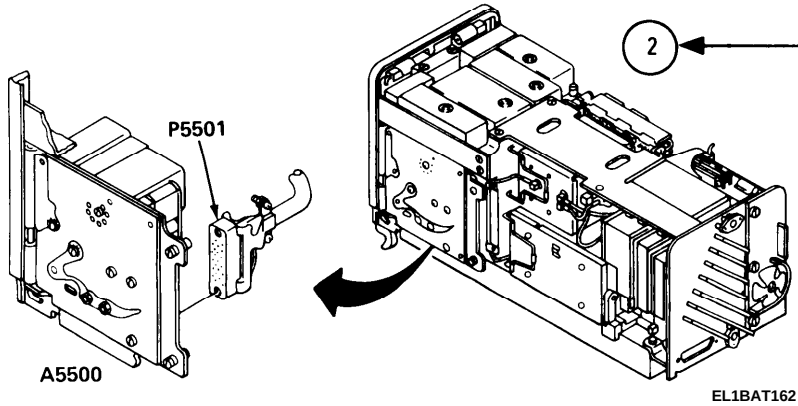
0Ω ?

NO

2

REPLACE A2000 ASSEMBLY (PARA 2-70).

4 CH 2-1



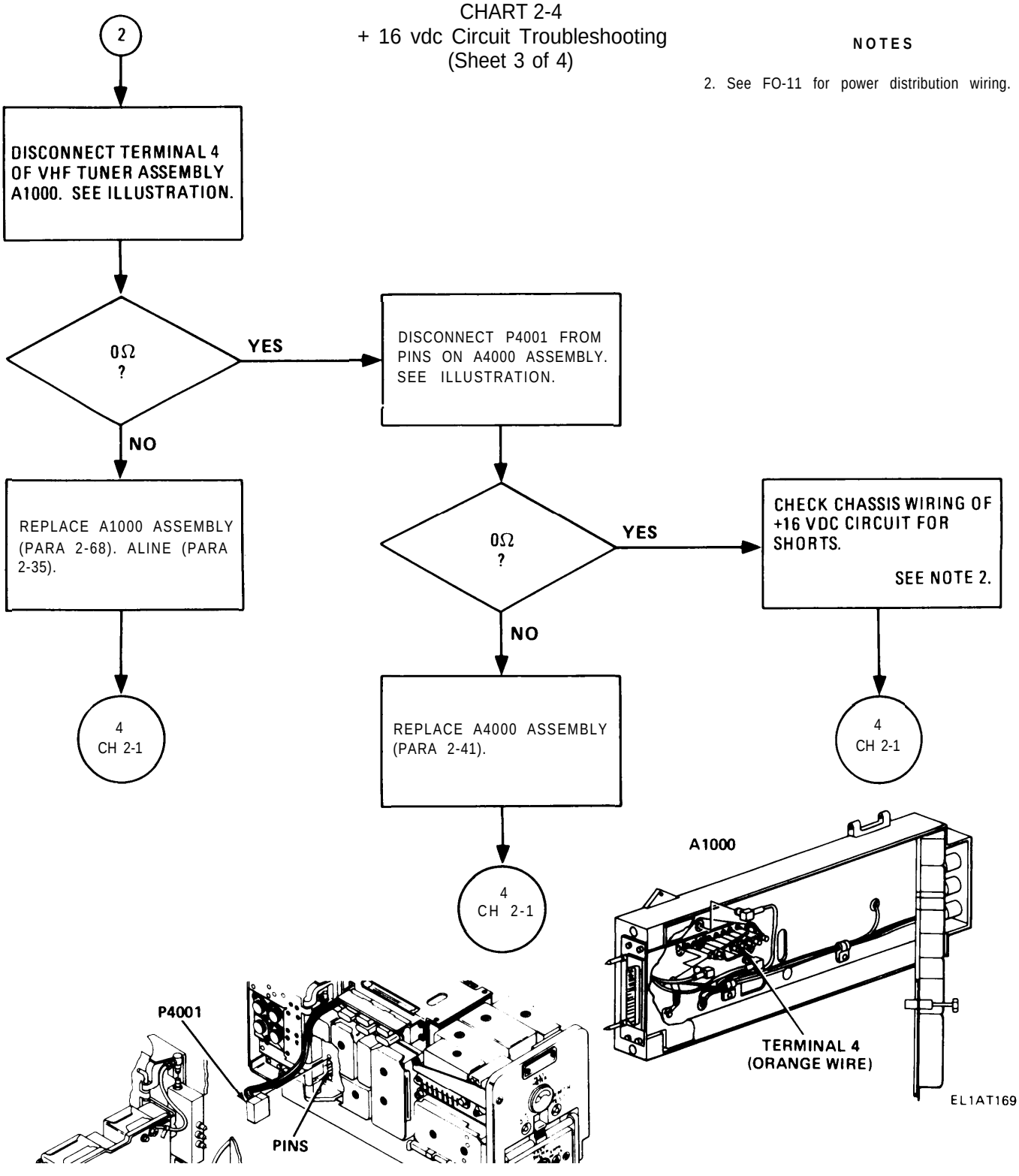
EL1BAT162

2-26. TROUBLESHOOTING CHARTS. (CONT)

CHART 2-4
+ 16 vdc Circuit Troubleshooting
(Sheet 3 of 4)

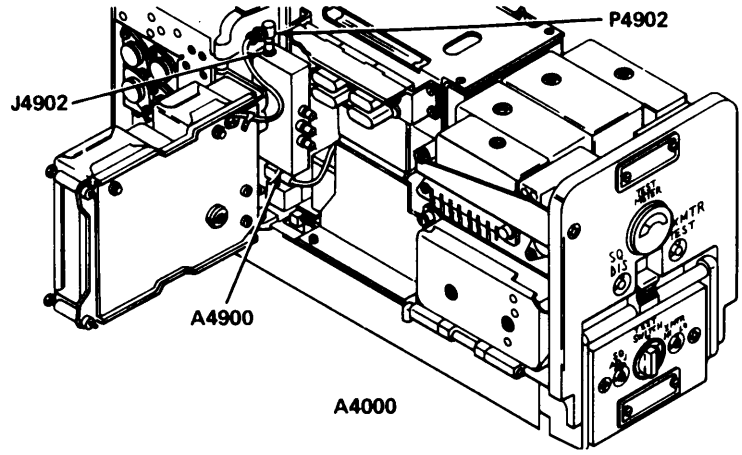
NOTES

2. See FO-11 for power distribution wiring.

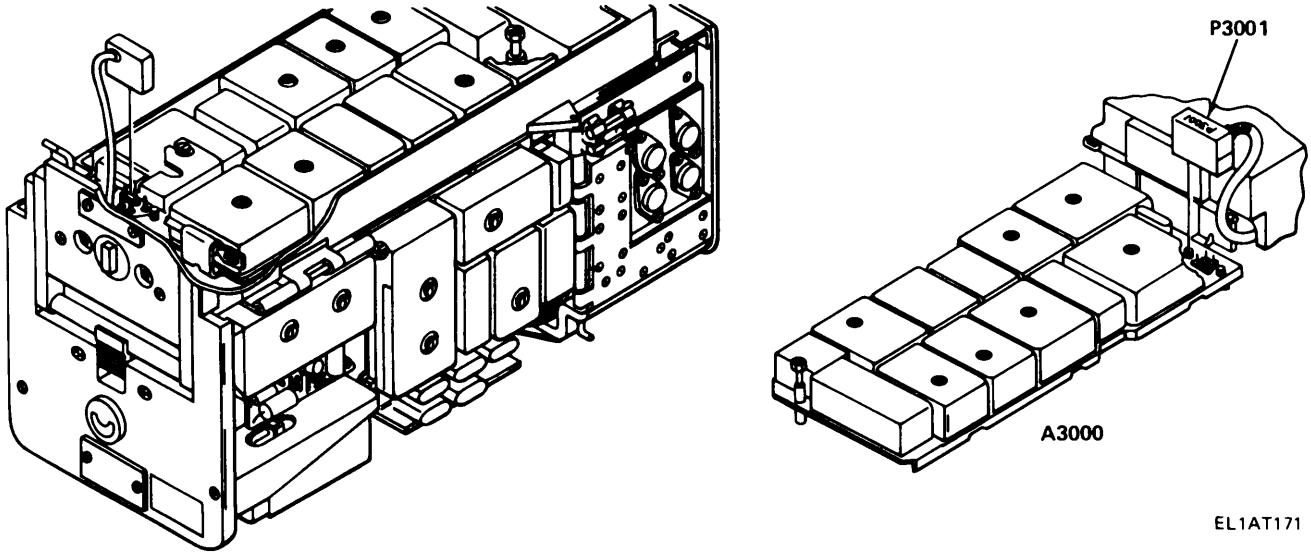


2-26. TROUBLESHOOTING CHARTS. (CONT)

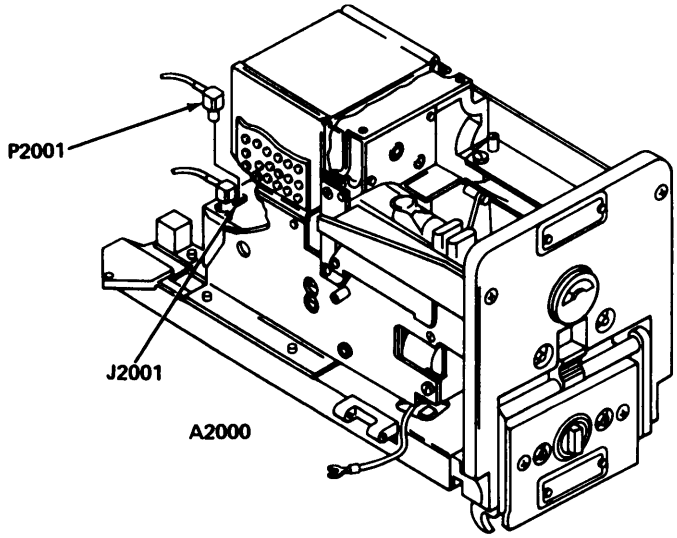
CHART 2-4
+16 vdc Circuit Troubleshooting
(Sheet 4 of 4)



EL1AT170



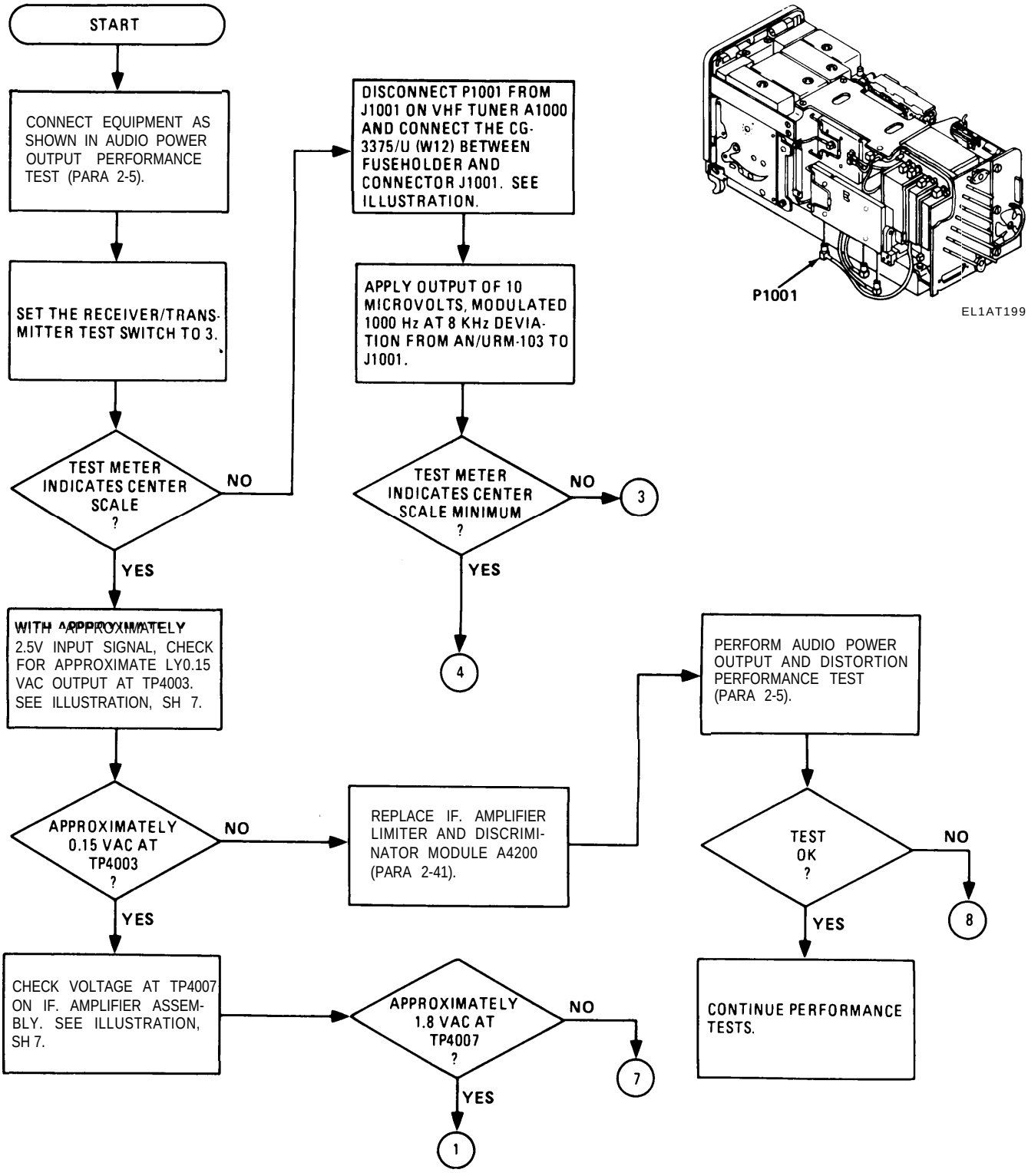
EL1AT171



EL1AT172

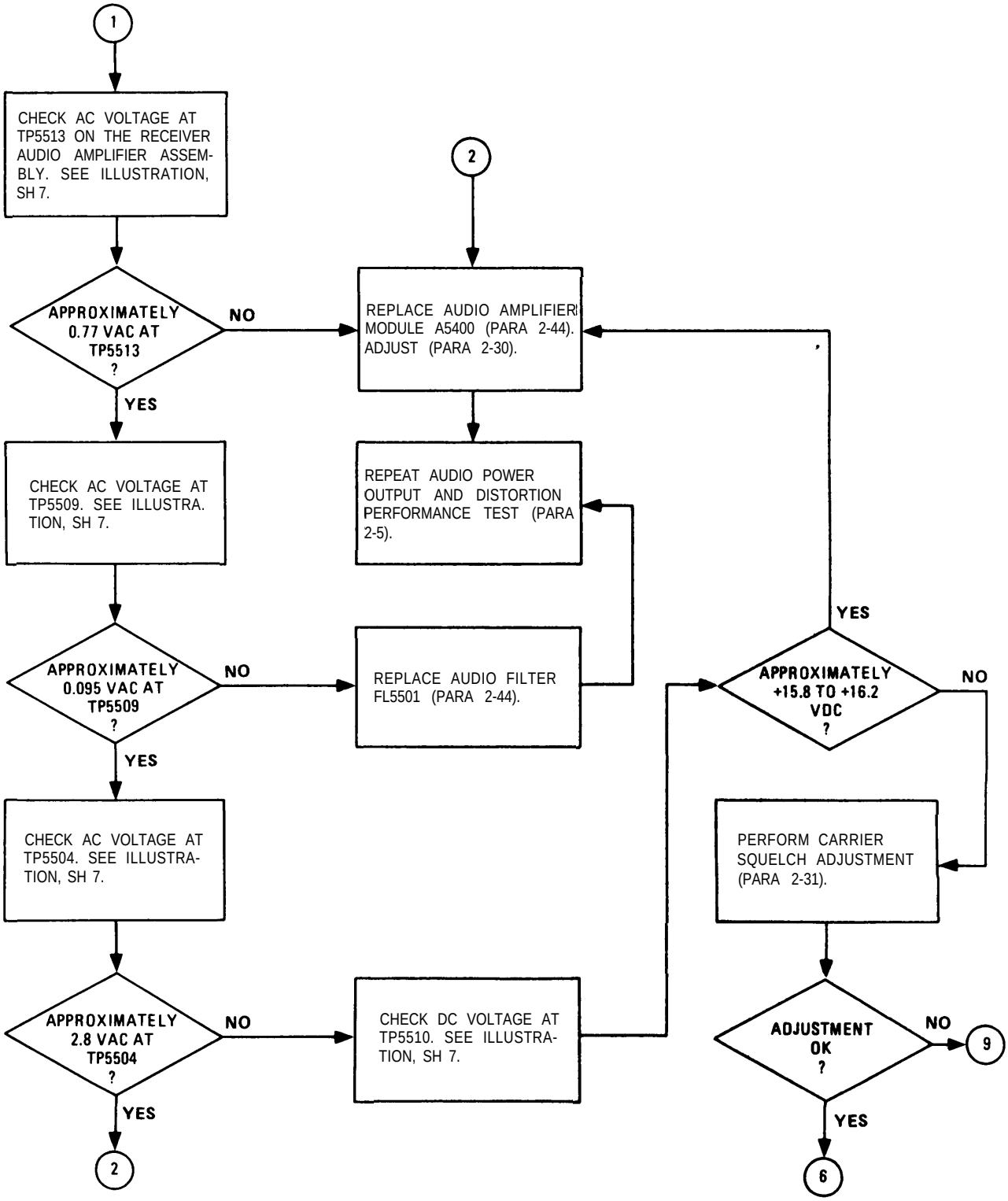
2-26. TROUBLESHOOTING CHARTS. (CONT)

CHART 2-5
No Audio Output Troubleshooting
(Sheet 1 of 8)


START
CONNECT EQUIPMENT AS SHOWN IN AUDIO POWER OUTPUT PERFORMANCE TEST (PARA 2-5).
SET THE RECEIVER/TRANSMITTER TEST SWITCH TO 3.
TEST METER INDICATES CENTER SCALE ?
NO
YES
DISCONNECT P1001 FROM J1001 ON VHF TUNER A1000 AND CONNECT THE CG-3375/U (W12) BETWEEN FUSEHOLDER AND CONNECTOR J1001. SEE ILLUSTRATION.
APPLY OUTPUT OF 10 MICROVOLTS, MODULATED 1000 Hz AT 8 KHz DEVIATION FROM AN/URM-103 TO J1001.
TEST METER INDICATES CENTER SCALE MINIMUM ?
NO
3
YES
4
P1001
EL1AT199
WITH APPROXIMATELY 2.5V INPUT SIGNAL, CHECK FOR APPROXIMATELY 0.15 VAC OUTPUT AT TP4003. SEE ILLUSTRATION, SH 7.
APPROXIMATELY 0.15 VAC AT TP4003 ?
NO
YES
REPLACE IF. AMPLIFIER LIMITER AND DISCRIMINATOR MODULE A4200 (PARA 2-41).
PERFORM AUDIO POWER OUTPUT AND DISTORTION PERFORMANCE TEST (PARA 2-5).
TEST OK ?
NO
8
YES
CONTINUE PERFORMANCE TESTS.
CHECK VOLTAGE AT TP4007 ON IF. AMPLIFIER ASSEMBLY. SEE ILLUSTRATION, SH 7.
APPROXIMATELY 1.8 VAC AT TP4007 ?
NO
7
YES
1

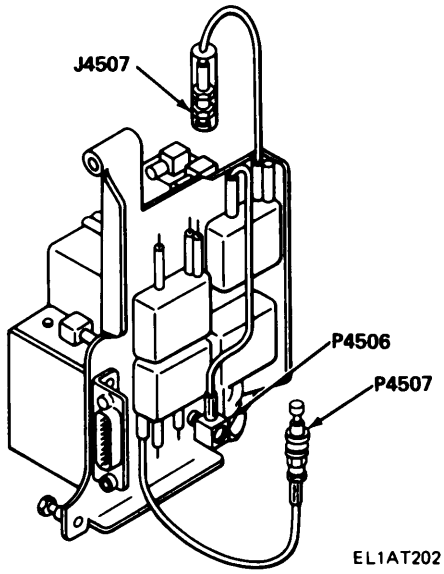
2-26. TROUBLESHOOTING CHARTS. (CONT)

CHART 2-5
No Audio Output Troubleshooting
(Sheet 2 of 8)


1
CHECK AC VOLTAGE AT TP5513 ON THE RECEIVER AUDIO AMPLIFIER ASSEMBLY. SEE ILLUSTRATION, SH 7.
APPROXIMATELY 0.77 VAC AT TP5513 ?
NO
YES
2
REPLACE AUDIO AMPLIFIER MODULE A5400 (PARA 2-44). ADJUST (PARA 2-30).
REPEAT AUDIO POWER OUTPUT AND DISTORTION PERFORMANCE TEST (PARA 2-5).
CHECK AC VOLTAGE AT TP5509. SEE ILLUSTRATION, SH 7.
APPROXIMATELY 0.095 VAC AT TP5509 ?
NO
YES
REPLACE AUDIO FILTER FL5501 (PARA 2-44).
CHECK AC VOLTAGE AT TP5504. SEE ILLUSTRATION, SH 7.
APPROXIMATELY 2.8 VAC AT TP5504 ?
NO
YES
2
CHECK DC VOLTAGE AT TP5510. SEE ILLUSTRATION, SH 7.
YES
APPROXIMATELY +15.8 TO +16.2 VDC ?
NO
PERFORM CARRIER SQUELCH ADJUSTMENT (PARA 2-31).
ADJUSTMENT OK ?
NO
9
YES
6

2-26. TROUBLESHOOTING CHARTS. (CONT)

CHART 2-5
No Audio Output Troubleshooting
(Sheet 3 of 8)



3

CHECK CABLE CONNECTIONS. → 13

DISCONNECT J4507 FROM P4507 ON RF CONTROL ASSEMBLY AND APPLY SIGNAL GENERATOR OUTPUT TO P4507. SEE ILLUSTRATION. ← 4

TEST METER INDICATES CENTER SCALE ?

NO → CHECK CONTINUITY OF RELAY K4502. IF DEFECTIVE REPLACE (PARA 2-65). → REPEAT AUDIO POWER OUTPUT AND DISTORTION PERFORMANCE TEST (PARA 2-5).

YES

DISCONNECT P4506 FROM J4506 AND APPLY THE SIGNAL GENERATOR OUTPUT TO J4506. SEE ILLUSTRATION.

CHECK CONTINUITY OF RELAY K4501. IF DEFECTIVE REPLACE (PARA 2-65). → REPEAT AUDIO POWER OUTPUT AND DISTORTION PERFORMANCE TEST (PARA 2-5).

TEST METER INIDCATES CENTER SCALE ?

NO → CHECK CONTINUITY OF RELAY K4501. IF DEFECTIVE REPLACE (PARA 2-65).

YES

DISCONNECT P4505 FROM J4505 AND CONNECT THE AN/URM-1030 OUTPUT TO J4505. SEE ILLUSTRATION, SH 8.

TEST METER INDICATES CENTER SCALE ?

NO → REPLACE REFLECTOMETER AND SIDETONE GATE DETECTOR (PARA 2-63).

YES

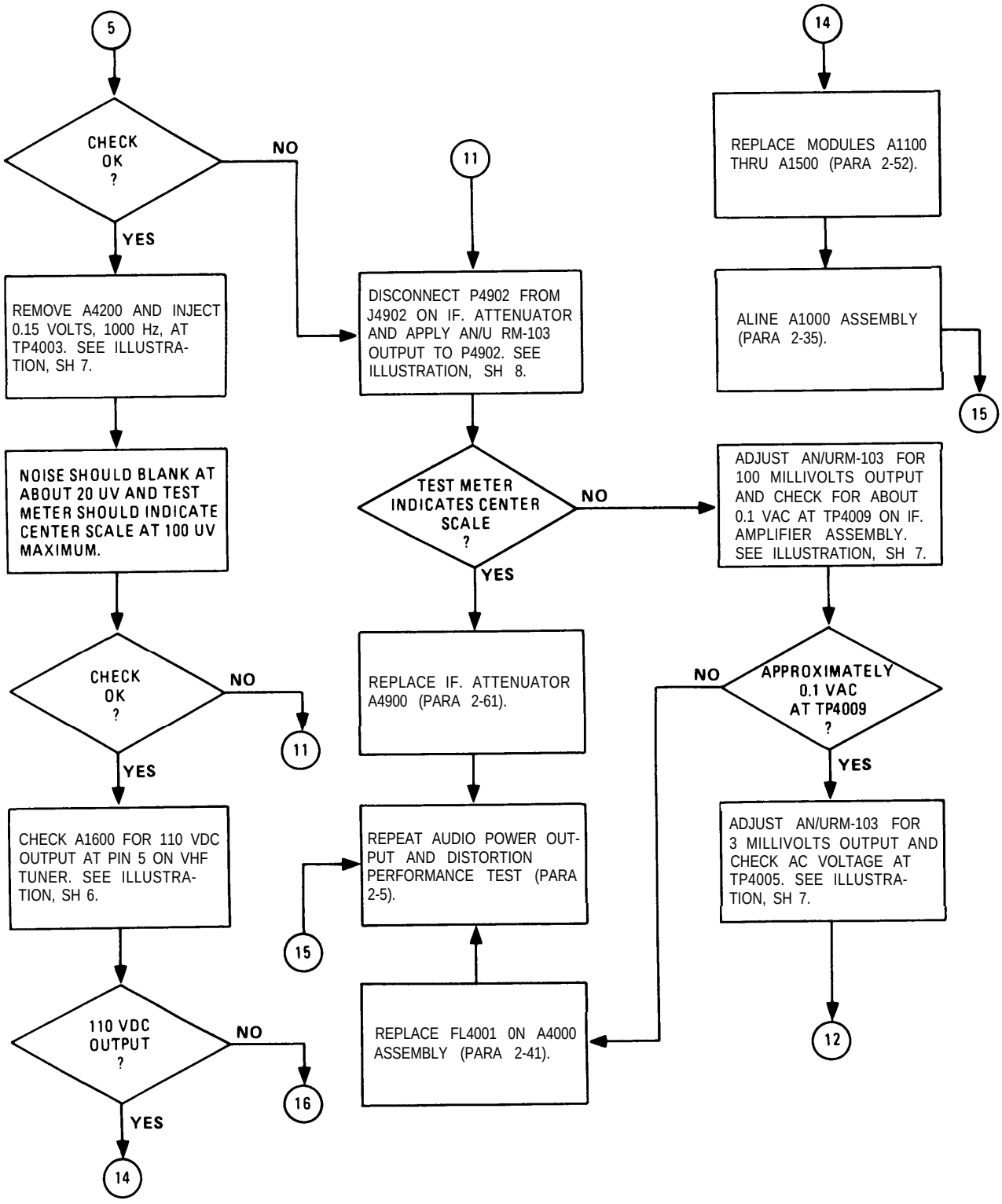
DISCONNECT P4901 FROM J4901 ON IF. ATTENUATOR A4900 AND INJECT 11.5 MHz IF. SIGNAL AT J4901. SEE ILLUSTRATION, SH 8. NOISE SHOULD BLANK AT ABOUT 20 μV AND TEST METER SHOULD INDICATE CENTER SCALE AT 100 μV MAXIMUM.

→ 5

← 13

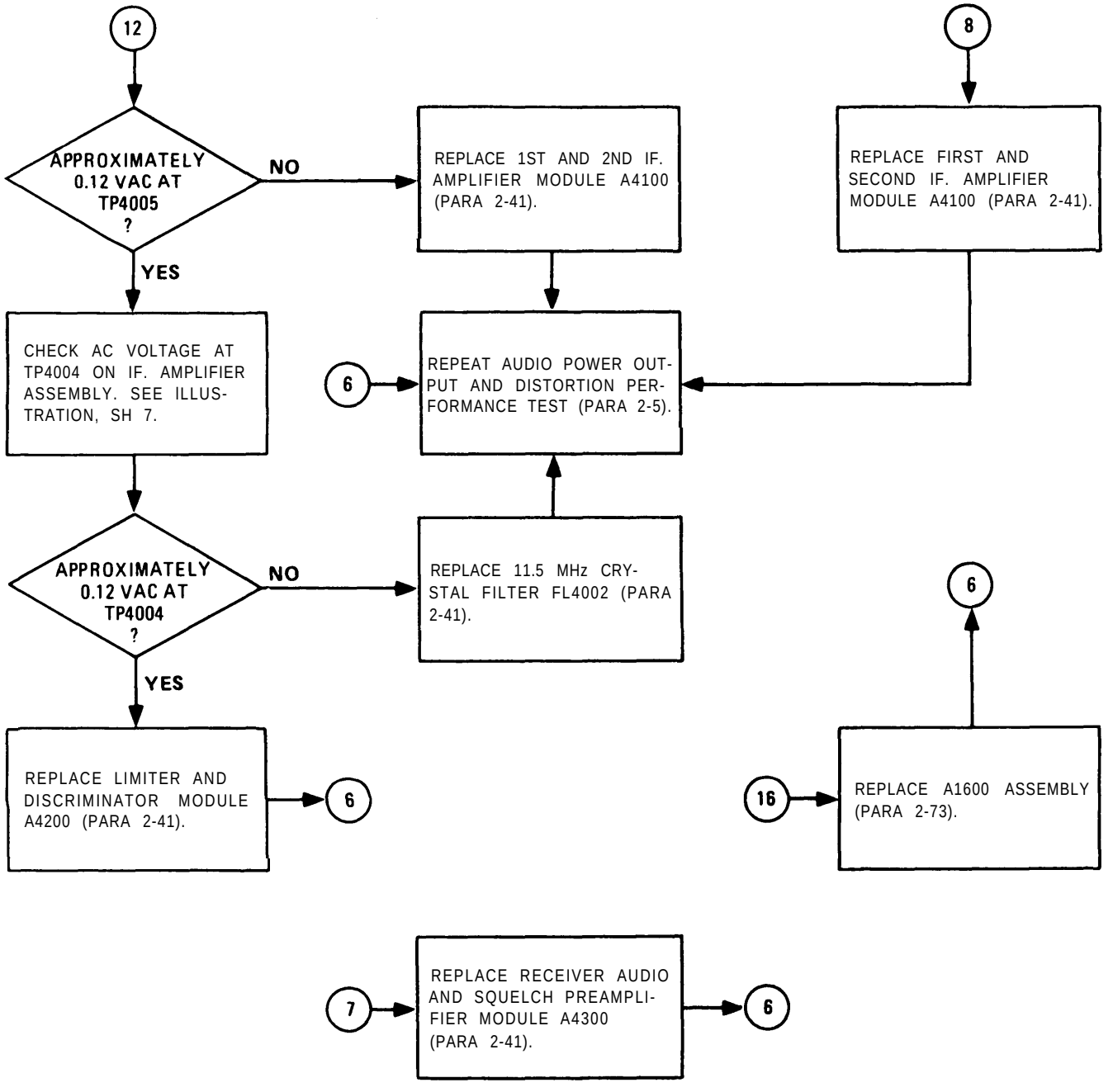
2-26. TROUBLESHOOTING CHARTS. (CONT)

CHART 2-5
No Audio Output Troubleshooting
(Sheet 4 of 8)


5
CHECK OK ?
NO
YES
REMOVE A4200 AND INJECT 0.15 VOLTS, 1000 Hz, AT TP4003. SEE ILLUSTRATION, SH 7.
NOISE SHOULD BLANK AT ABOUT 20 UV AND TEST METER SHOULD INDICATE CENTER SCALE AT 100 UV MAXIMUM.
CHECK OK ?
NO
11
YES
CHECK A1600 FOR 110 VDC OUTPUT AT PIN 5 ON VHF TUNER. SEE ILLUSTRATION, SH 6.
110 VDC OUTPUT ?
NO
16
YES
14
11
DISCONNECT P4902 FROM J4902 ON IF. ATTENUATOR AND APPLY AN/U RM-103 OUTPUT TO P4902. SEE ILLUSTRATION, SH 8.
TEST METER INDICATES CENTER SCALE ?
NO
YES
REPLACE IF. ATTENUATOR A4900 (PARA 2-61).
REPEAT AUDIO POWER OUTPUT AND DISTORTION PERFORMANCE TEST (PARA 2-5).
15
REPLACE FL4001 0N A4000 ASSEMBLY (PARA 2-41).
14
REPLACE MODULES A1100 THRU A1500 (PARA 2-52).
ALINE A1000 ASSEMBLY (PARA 2-35).
15
ADJUST AN/URM-103 FOR 100 MILLIVOLTS OUTPUT AND CHECK FOR ABOUT 0.1 VAC AT TP4009 ON IF. AMPLIFIER ASSEMBLY. SEE ILLUSTRATION, SH 7.
APPROXIMATELY 0.1 VAC AT TP4009 ?
NO
YES
ADJUST AN/URM-103 FOR 3 MILLIVOLTS OUTPUT AND CHECK AC VOLTAGE AT TP4005. SEE ILLUSTRATION, SH 7.
12

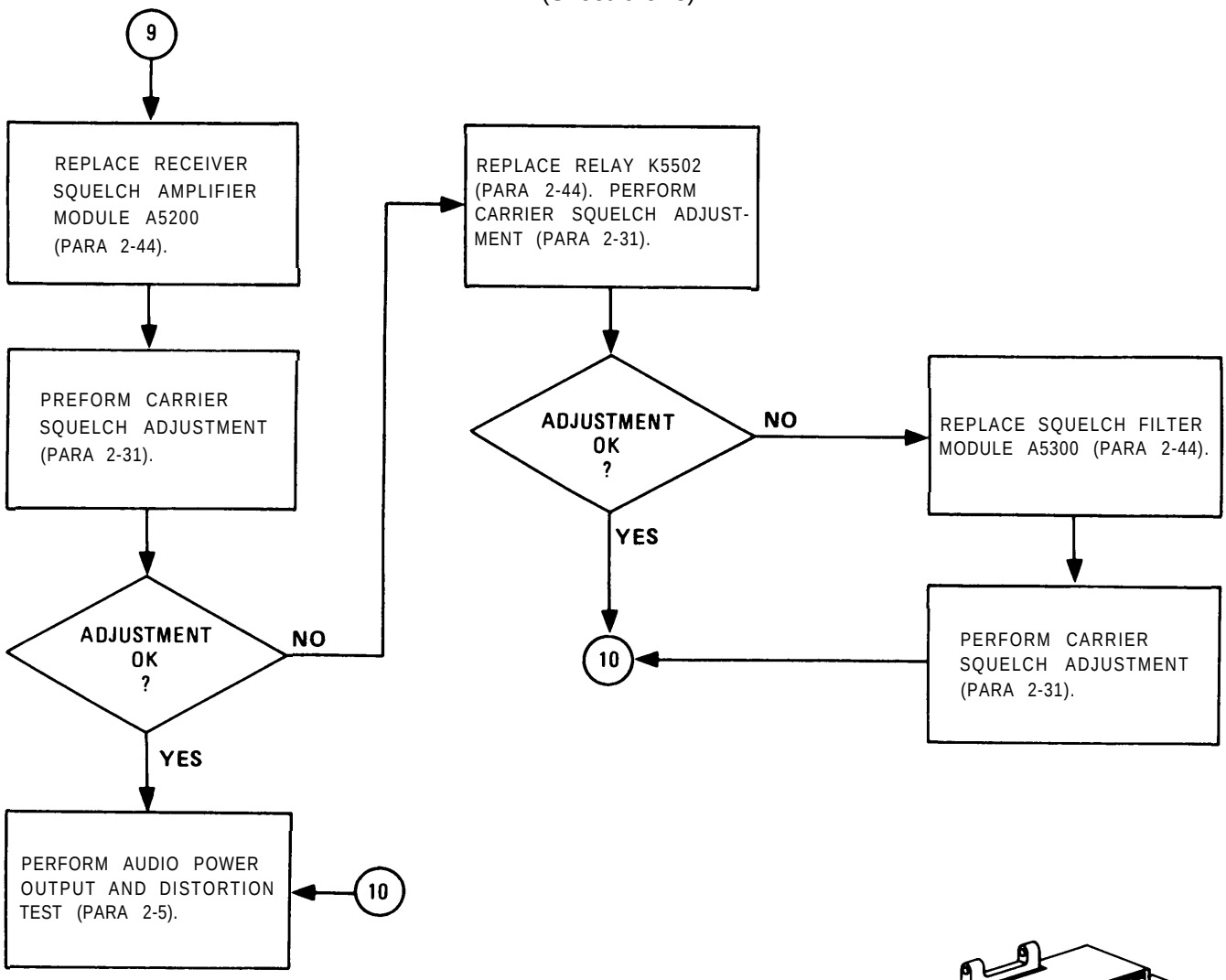
2-26. TROUBLESHOOTING CHARTS. (CONT)

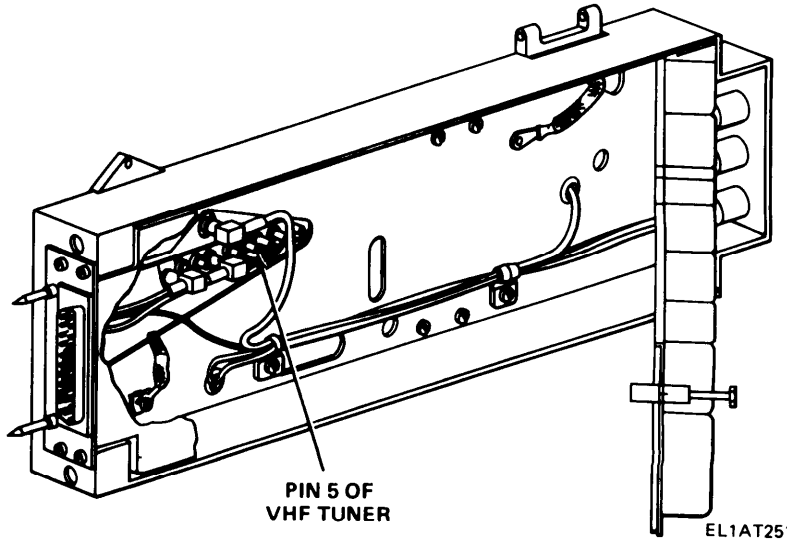
CHART 2-5
No Audio Output Troubleshooting
(Sheet 5 of 8)


12
APPROXIMATELY 0.12 VAC AT TP4005 ?
NO
REPLACE 1ST AND 2ND IF. AMPLIFIER MODULE A4100 (PARA 2-41).
8
REPLACE FIRST AND SECOND IF. AMPLIFIER MODULE A4100 (PARA 2-41).
YES
CHECK AC VOLTAGE AT TP4004 ON IF. AMPLIFIER ASSEMBLY. SEE ILLUSTRATION, SH 7.
6
REPEAT AUDIO POWER OUTPUT AND DISTORTION PERFORMANCE TEST (PARA 2-5).
APPROXIMATELY 0.12 VAC AT TP4004 ?
NO
REPLACE 11.5 MHz CRYSTAL FILTER FL4002 (PARA 2-41).
6
YES
REPLACE LIMITER AND DISCRIMINATOR MODULE A4200 (PARA 2-41).
6
16
REPLACE A1600 ASSEMBLY (PARA 2-73).
7
REPLACE RECEIVER AUDIO AND SQUELCH PREAMPLIFIER MODULE A4300 (PARA 2-41).
6

2-26. TROUBLESHOOTING CHARTS. (CONT)

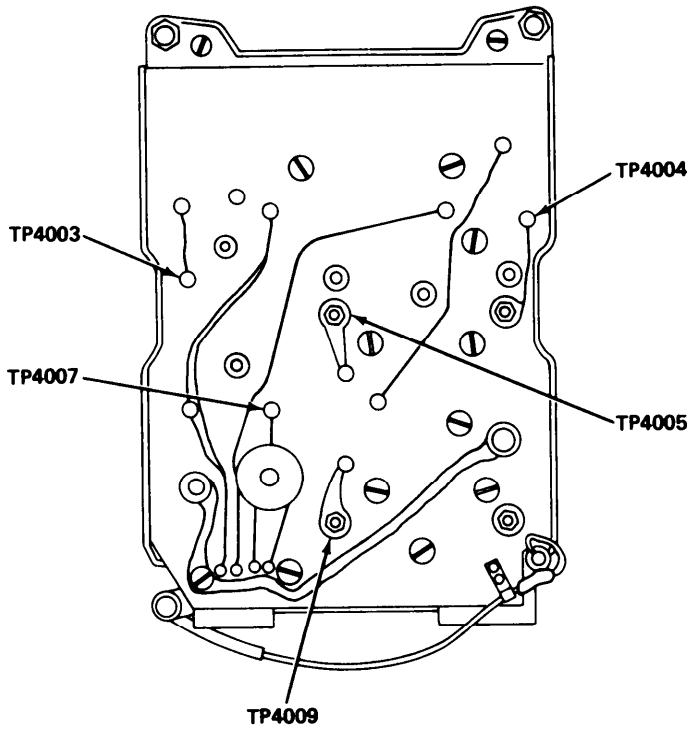
CHART 2-5
No Audio Output Troubleshooting
(Sheet 6 of 8)


9
REPLACE RECEIVER SQUELCH AMPLIFIER MODULE A5200 (PARA 2-44).
PREFORM CARRIER SQUELCH ADJUSTMENT (PARA 2-31).
ADJUSTMENT OK ?
NO
YES
REPLACE RELAY K5502 (PARA 2-44). PERFORM CARRIER SQUELCH ADJUSTMENT (PARA 2-31).
ADJUSTMENT OK ?
NO
YES
REPLACE SQUELCH FILTER MODULE A5300 (PARA 2-44).
PERFORM CARRIER SQUELCH ADJUSTMENT (PARA 2-31).
10
PERFORM AUDIO POWER OUTPUT AND DISTORTION TEST (PARA 2-5).
10

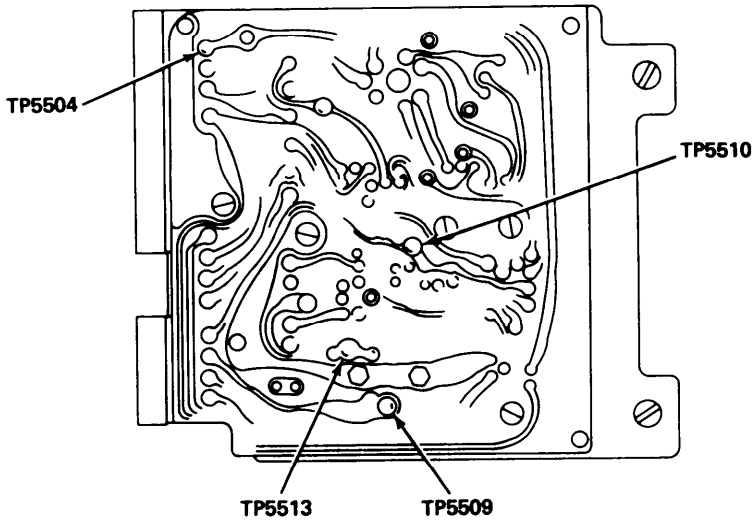


2-26. TROUBLESHOOTING CHARTS. (CONT)

CHART 2-5
No Audio Output Troubleshooting



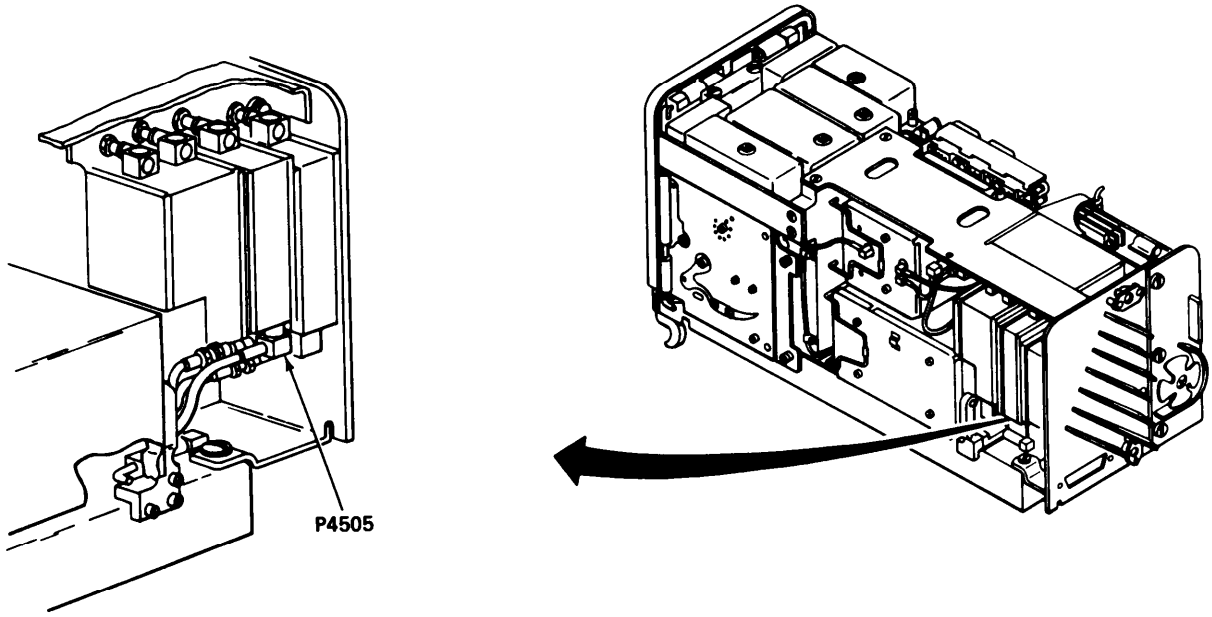
EL1AT198



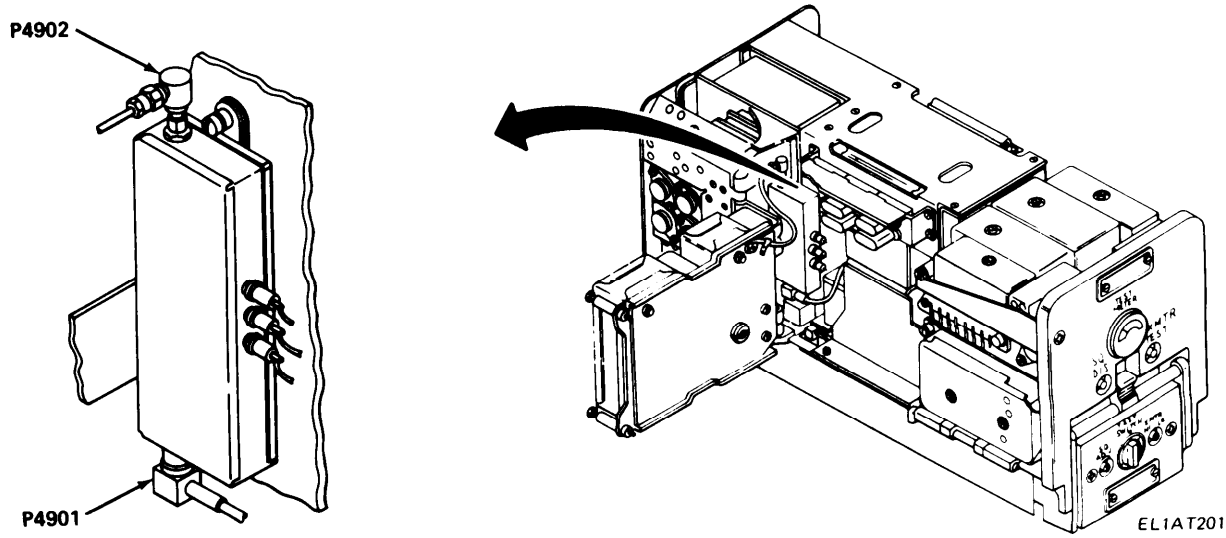
EL1AT200

2-26. TROUBLESHOOTING CHARTS. (CONT)

CHART 2-5
No Audio Output Troubleshooting
(Sheet 8 of 8)



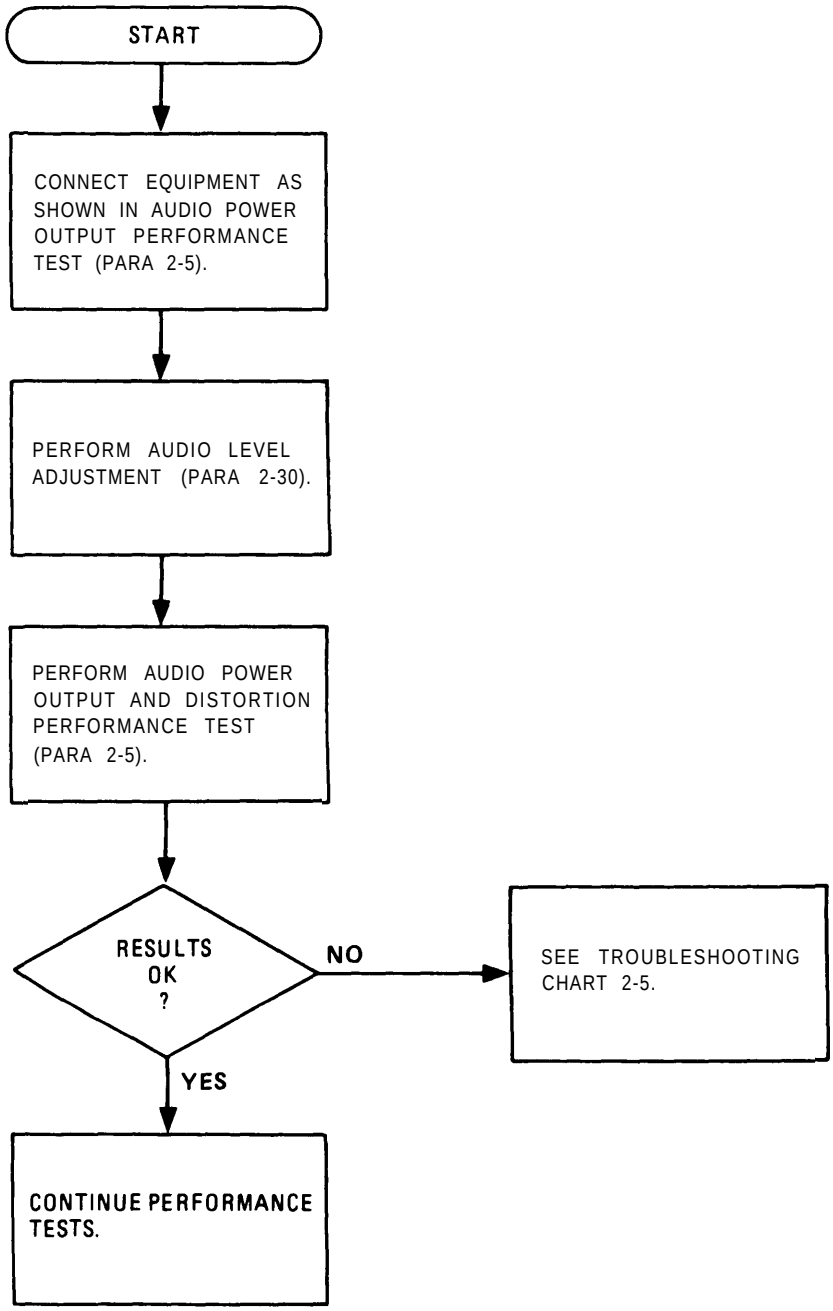
EL1AT203



EL1AT201

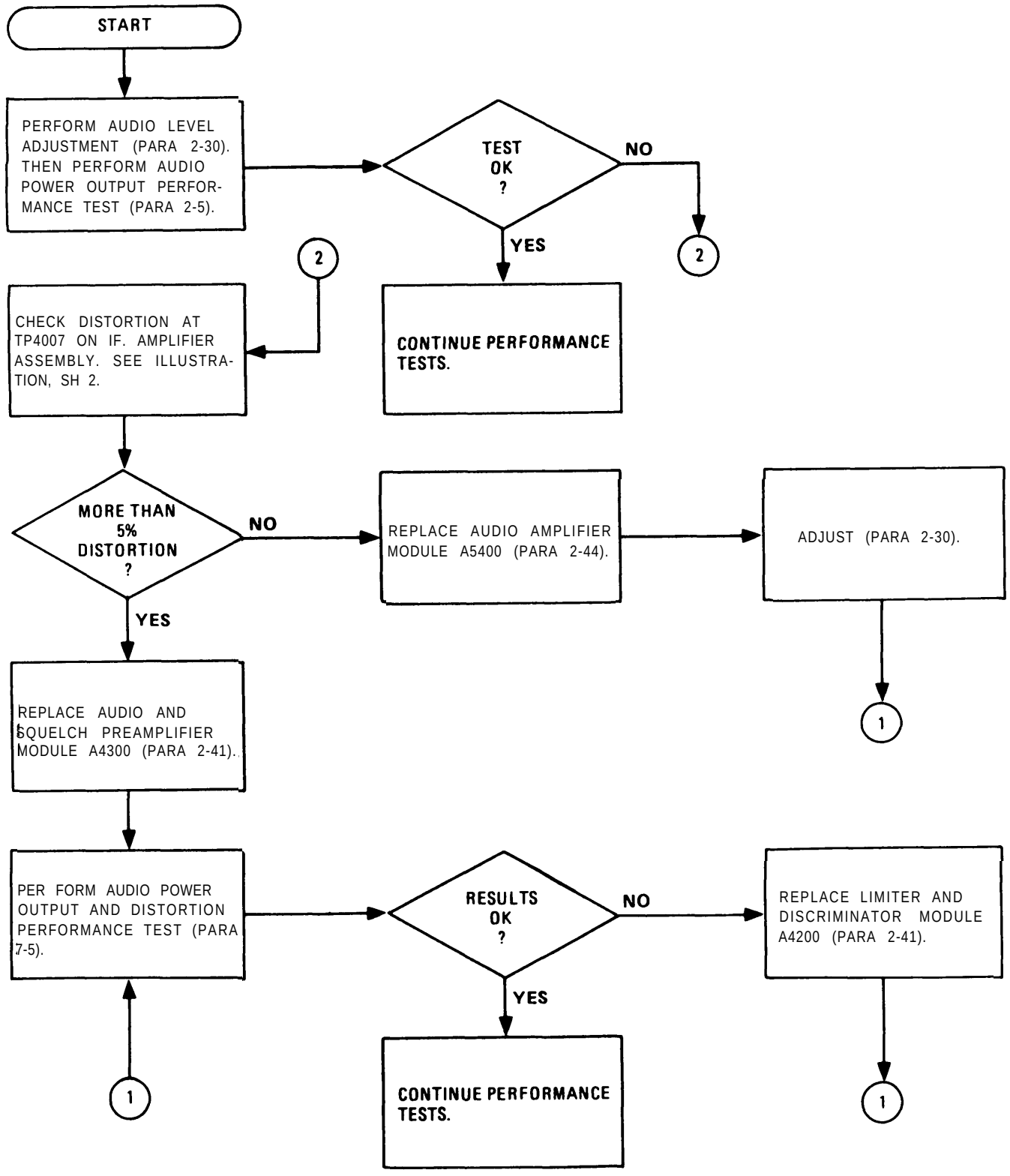
2-26. TROUBLESHOOTING CHARTS. (CONT)

CHART 2-6
Audio Power Troubleshooting


START
CONNECT EQUIPMENT AS SHOWN IN AUDIO POWER OUTPUT PERFORMANCE TEST (PARA 2-5).
PERFORM AUDIO LEVEL ADJUSTMENT (PARA 2-30).
PERFORM AUDIO POWER OUTPUT AND DISTORTION PERFORMANCE TEST (PARA 2-5).
RESULTS OK ?
NO
SEE TROUBLESHOOTING CHART 2-5.
YES
CONTINUE PERFORMANCE TESTS.

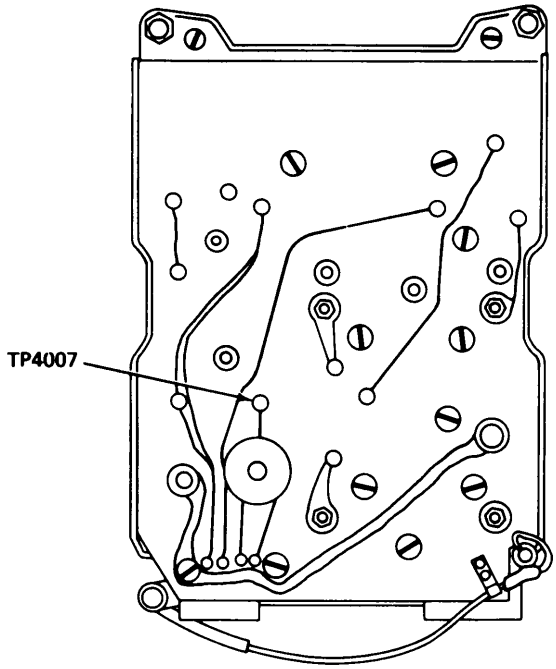
2-26. TROUBLESHOOTING CHARTS. (CONT)

CHART 2-7
Audio Distortion Troubleshooting
(Sheet 1 of 2)



2-26. TROUBLESHOOTING CHARTS. (CONT)

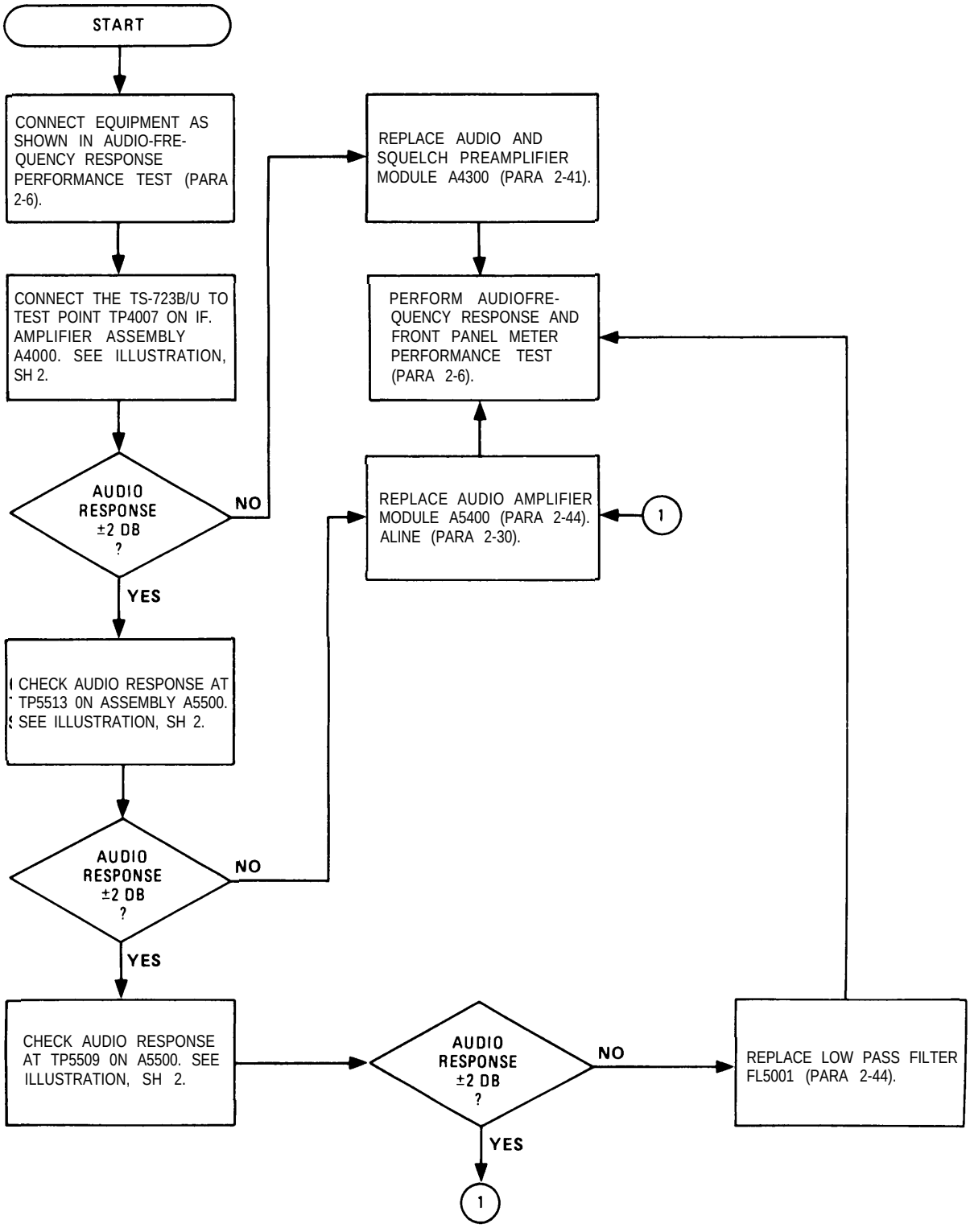
CHART 2-7
Audio Distortion Troubleshooting
(Sheet 2 of 2)



EL1AT206

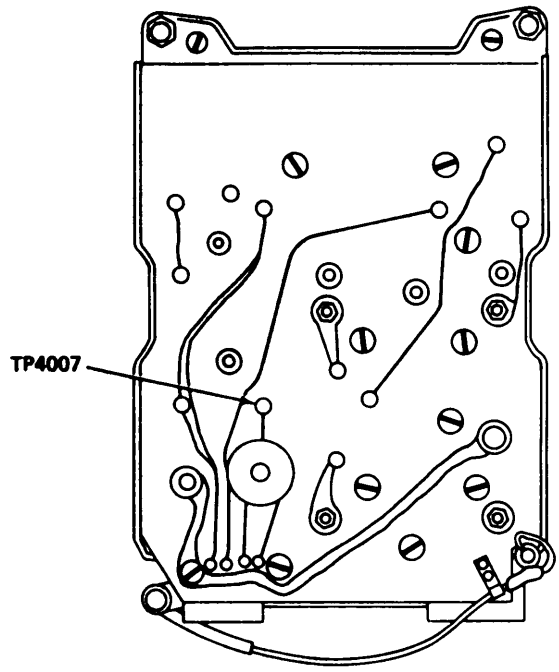
2-26. TROUBLESHOOTING CHARTS. (CONT)

CHART 2-8
Poor Audio Response Troubleshooting
(Sheet 1 of 2)

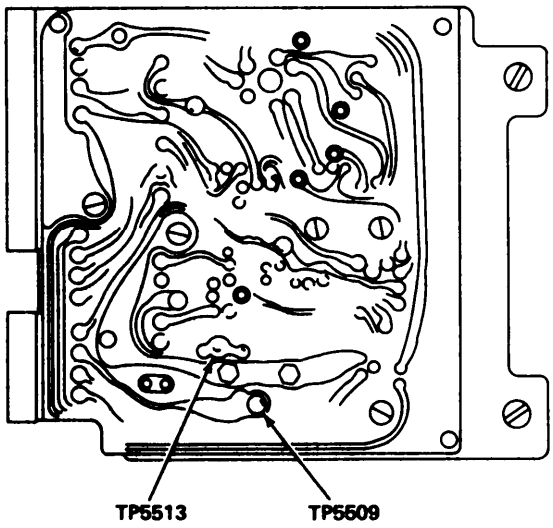

START
CONNECT EQUIPMENT AS SHOWN IN AUDIO-FREQUENCY RESPONSE PERFORMANCE TEST (PARA 2-6).
CONNECT THE TS-723B/U TO TEST POINT TP4007 ON IF. AMPLIFIER ASSEMBLY A4000. SEE ILLUSTRATION, SH 2.
AUDIO RESPONSE ±2 DB ?
NO
YES
REPLACE AUDIO AND SQUELCH PREAMPLIFIER MODULE A4300 (PARA 2-41).
PERFORM AUDIOFREQUENCY RESPONSE AND FRONT PANEL METER PERFORMANCE TEST (PARA 2-6).
REPLACE AUDIO AMPLIFIER MODULE A5400 (PARA 2-44). ALINE (PARA 2-30).
1
CHECK AUDIO RESPONSE AT TP5513 0N ASSEMBLY A5500. SEE ILLUSTRATION, SH 2.
AUDIO RESPONSE ±2 DB ?
NO
YES
CHECK AUDIO RESPONSE AT TP5509 0N A5500. SEE ILLUSTRATION, SH 2.
AUDIO RESPONSE ±2 DB ?
NO
YES
REPLACE LOW PASS FILTER FL5001 (PARA 2-44).
1

2-26. TROUBLESHOOTING CHARTS. (CONT)

CHART 2-8
Poor Audio Response Troubleshooting
(Sheet 2 of 2)



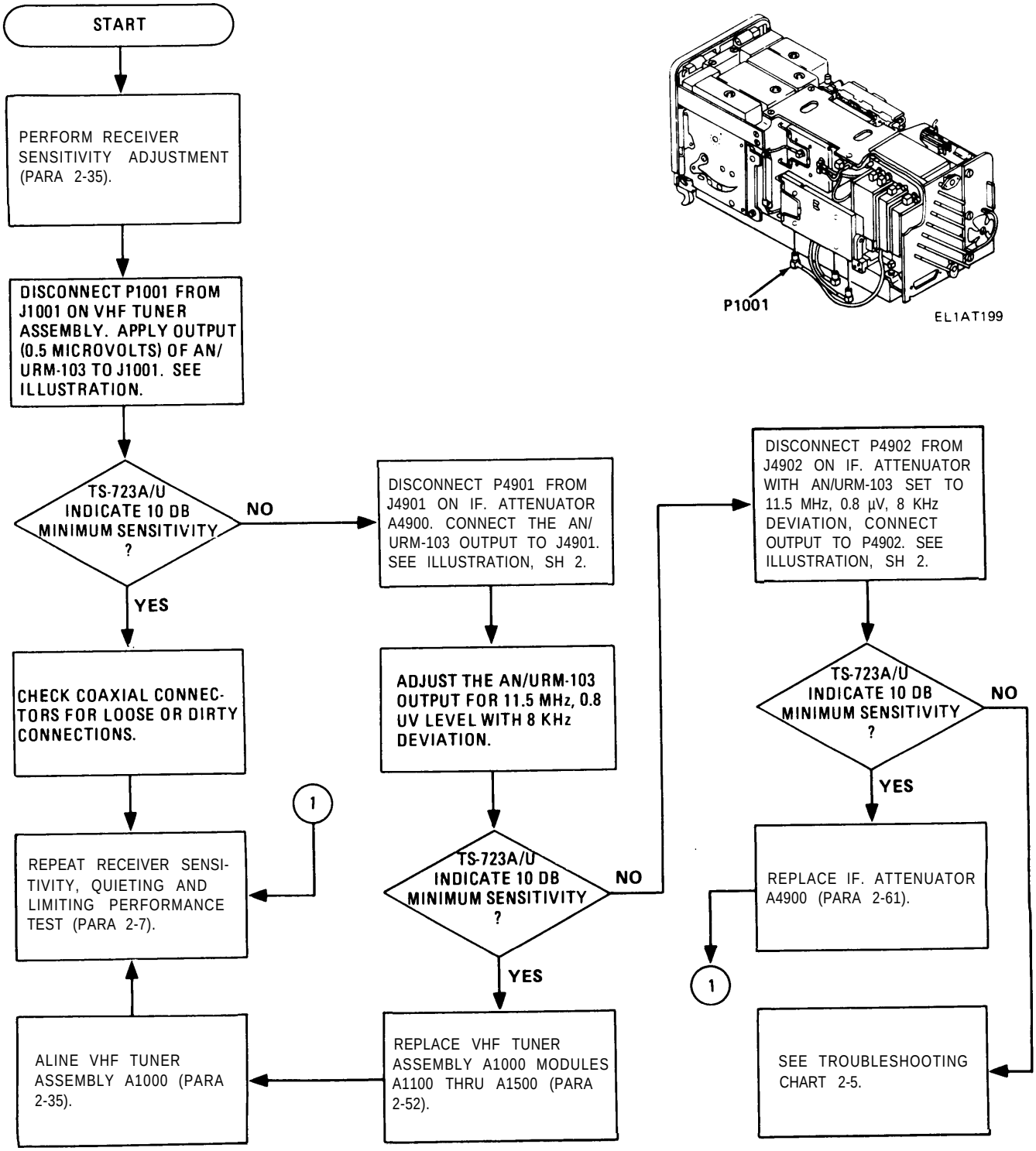
EL1AT206



EL1AT197

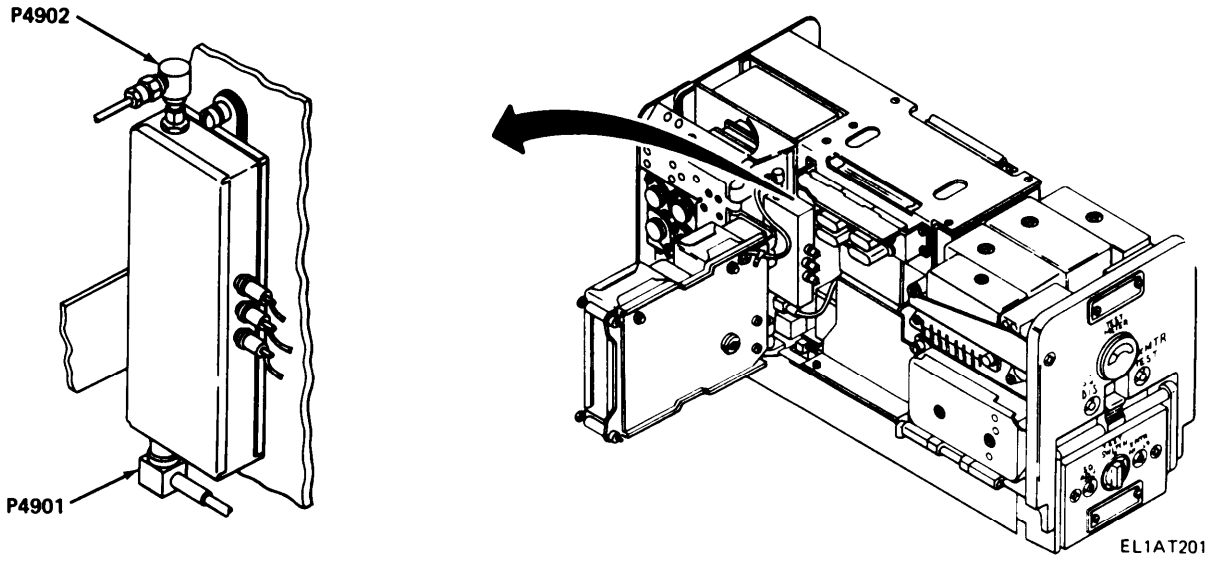
2-26. TROUBLESHOOTING CHARTS. (CONT)

CHART 2-9
Poor Sensitivity Troubleshooting
(Sheet 1 of 2)


START
PERFORM RECEIVER SENSITIVITY ADJUSTMENT (PARA 2-35).
DISCONNECT P1001 FROM J1001 ON VHF TUNER ASSEMBLY. APPLY OUTPUT (0.5 MICROVOLTS) OF AN/URM-103 TO J1001. SEE ILLUSTRATION.
TS-723A/U INDICATE 10 DB MINIMUM SENSITIVITY ?
NO
YES
DISCONNECT P4901 FROM J4901 ON IF. ATTENUATOR A4900. CONNECT THE AN/URM-103 OUTPUT TO J4901. SEE ILLUSTRATION, SH 2.
ADJUST THE AN/URM-103 OUTPUT FOR 11.5 MHz, 0.8 UV LEVEL WITH 8 KHz DEVIATION.
TS-723A/U INDICATE 10 DB MINIMUM SENSITIVITY ?
NO
YES
DISCONNECT P4902 FROM J4902 ON IF. ATTENUATOR WITH AN/URM-103 SET TO 11.5 MHz, 0.8 µV, 8 KHz DEVIATION, CONNECT OUTPUT TO P4902. SEE ILLUSTRATION, SH 2.
TS-723A/U INDICATE 10 DB MINIMUM SENSITIVITY ?
NO
YES
REPLACE IF. ATTENUATOR A4900 (PARA 2-61).
1
SEE TROUBLESHOOTING CHART 2-5.
CHECK COAXIAL CONNECTORS FOR LOOSE OR DIRTY CONNECTIONS.
1
REPEAT RECEIVER SENSITIVITY, QUIETING AND LIMITING PERFORMANCE TEST (PARA 2-7).
ALINE VHF TUNER ASSEMBLY A1000 (PARA 2-35).
REPLACE VHF TUNER ASSEMBLY A1000 MODULES A1100 THRU A1500 (PARA 2-52).
P1001
EL1AT199

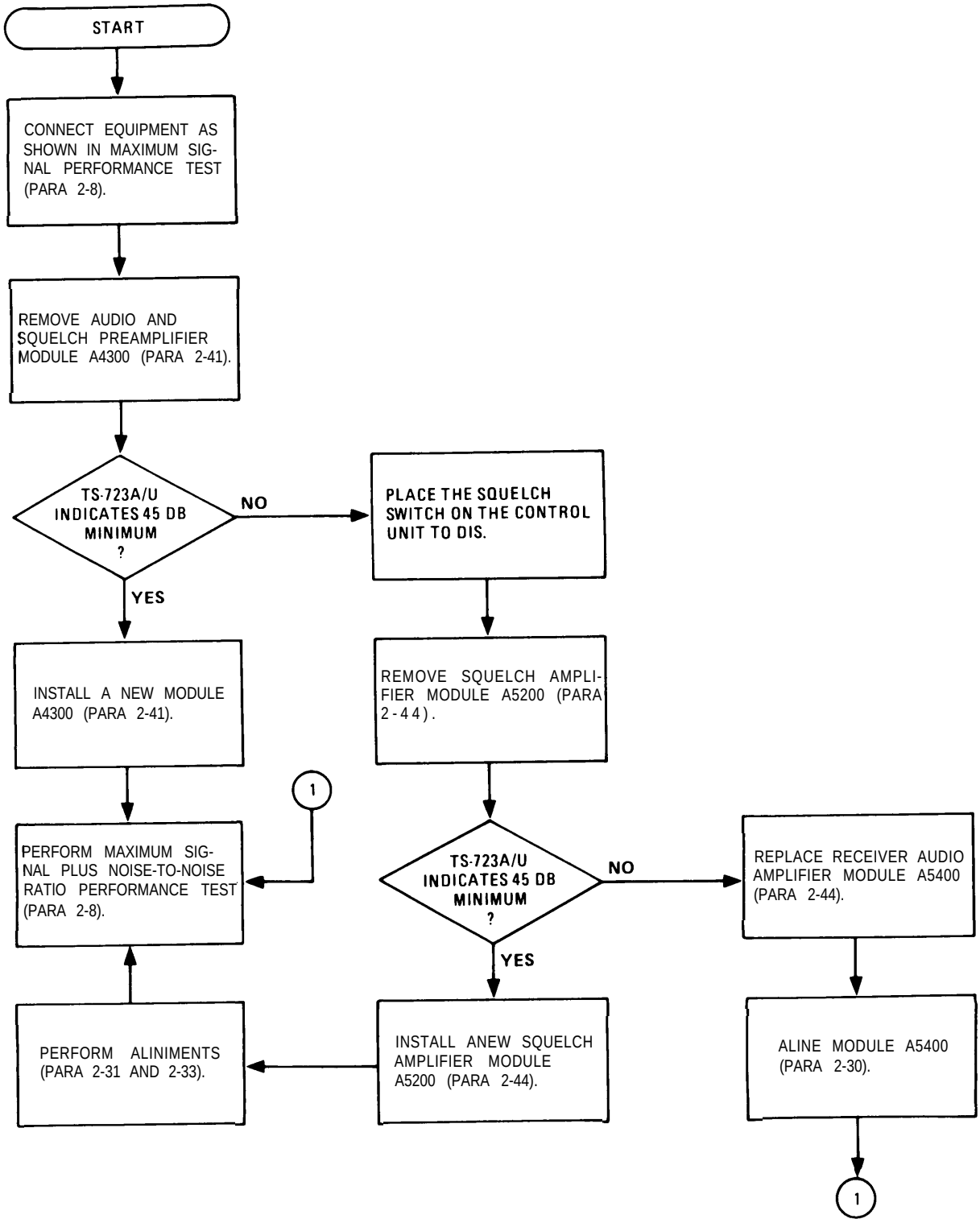
2-26. TROUBLESHOOTING CHARTS. (CONT)

CHART 2-9
Poor Sensitivity Troubleshooting
(Sheet 2 of 2)



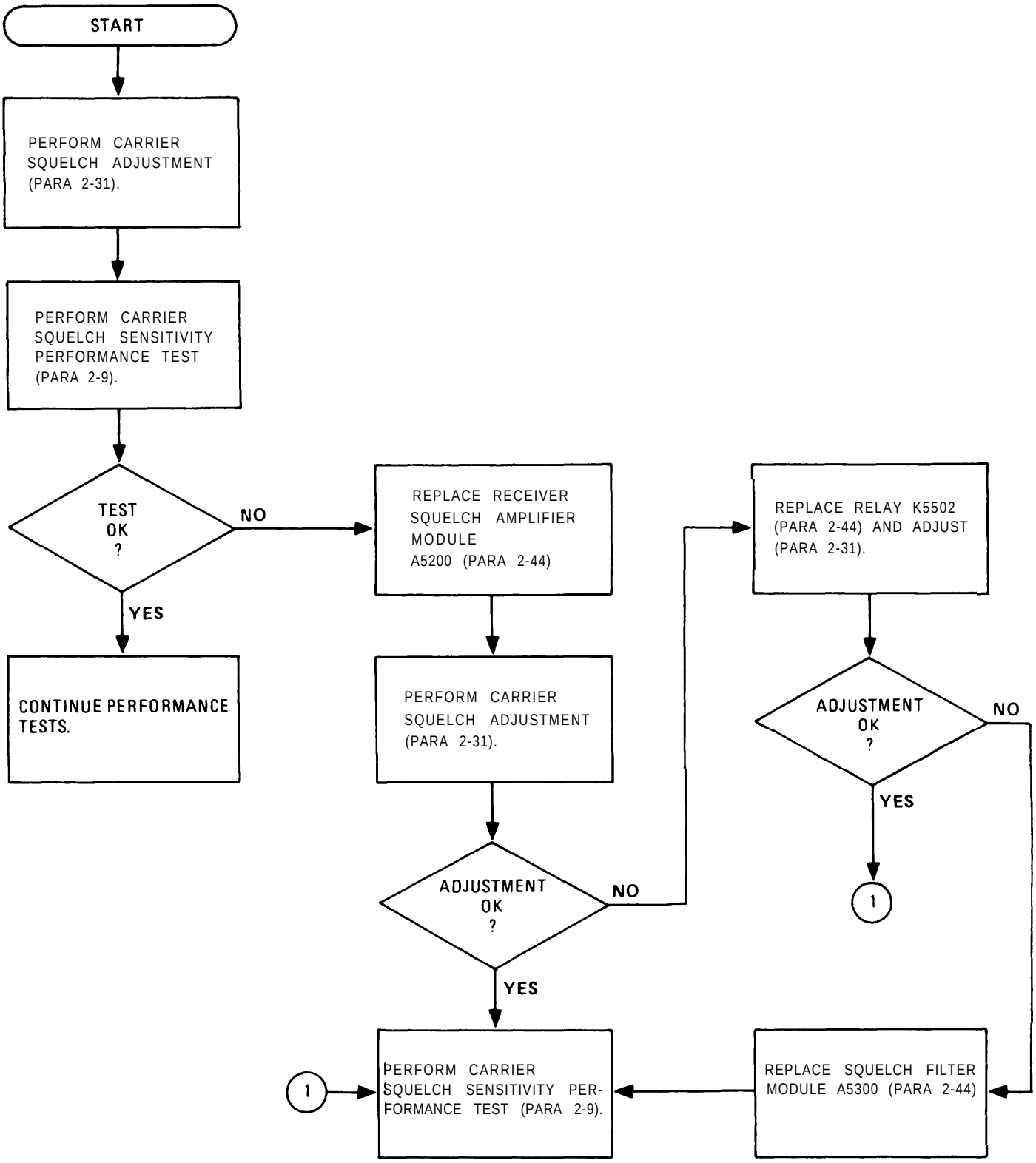
2-26. TROUBLESHOOTING CHARTS. (CONT)

CHART 2-10
Maximum Signal Plus Noise-to-Noise Ratio Troubleshooting


START
CONNECT EQUIPMENT AS SHOWN IN MAXIMUM SIGNAL PERFORMANCE TEST (PARA 2-8).
REMOVE AUDIO AND SQUELCH PREAMPLIFIER MODULE A4300 (PARA 2-41).
TS-723A/U INDICATES 45 DB MINIMUM ?
NO
YES
PLACE THE SQUELCH SWITCH ON THE CONTROL UNIT TO DIS.
INSTALL A NEW MODULE A4300 (PARA 2-41).
REMOVE SQUELCH AMPLIFIER MODULE A5200 (PARA 2-44).
1
PERFORM MAXIMUM SIGNAL PLUS NOISE-TO-NOISE RATIO PERFORMANCE TEST (PARA 2-8).
TS-723A/U INDICATES 45 DB MINIMUM ?
NO
YES
REPLACE RECEIVER AUDIO AMPLIFIER MODULE A5400 (PARA 2-44).
PERFORM ALINIMENTS (PARA 2-31 AND 2-33).
INSTALL ANEW SQUELCH AMPLIFIER MODULE A5200 (PARA 2-44).
ALINE MODULE A5400 (PARA 2-30).
1

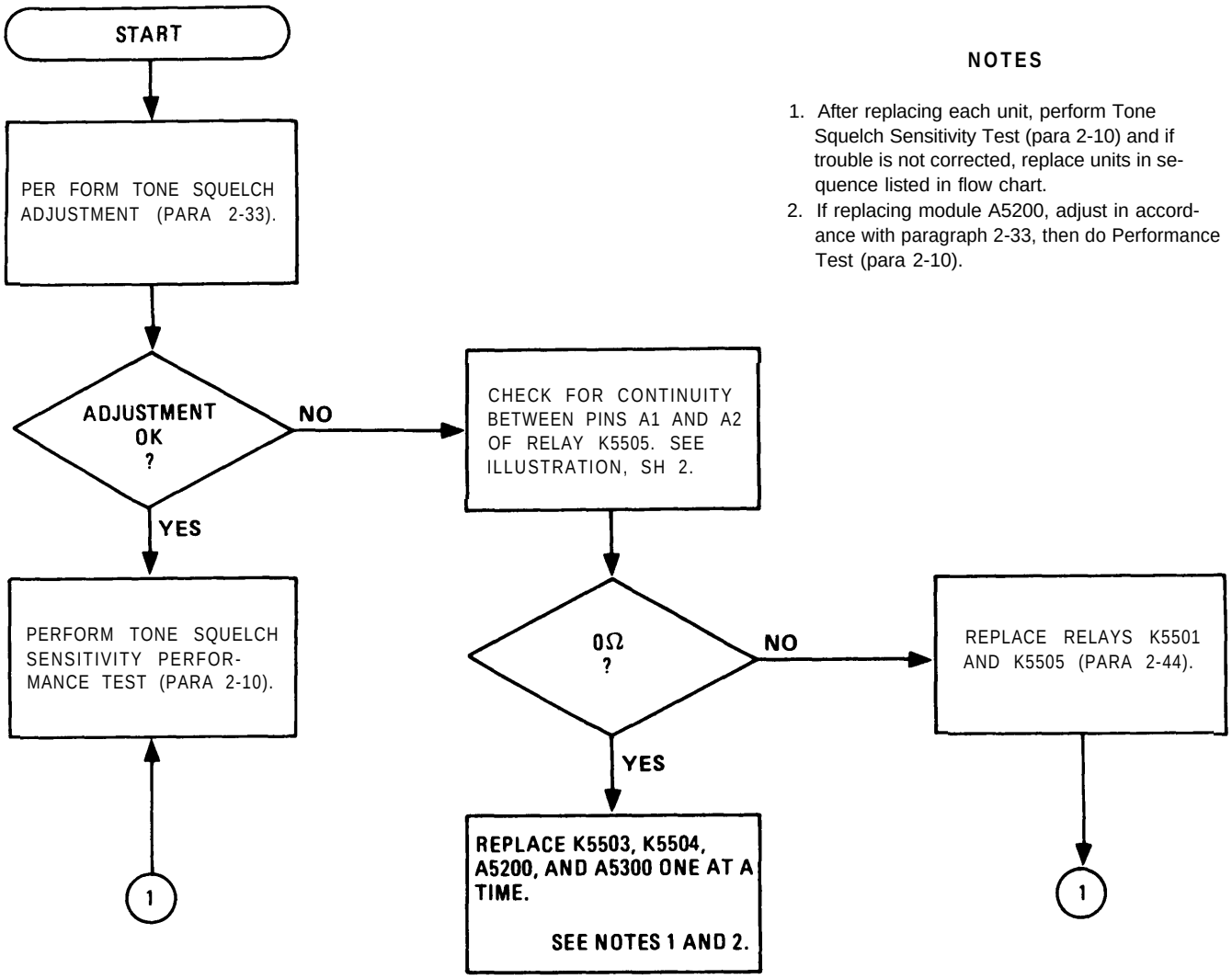
2-26. TROUBLESHOOTING CHARTS. (CONT)

CHART 2-11
Carrier Squelch Sensitivity Troubleshooting



2-26. TROUBLESHOOTING CHARTS. (CONT)

CHART 2-12
Tone Squelch Sensitivity Troubleshooting
(Sheet 1 of 2)

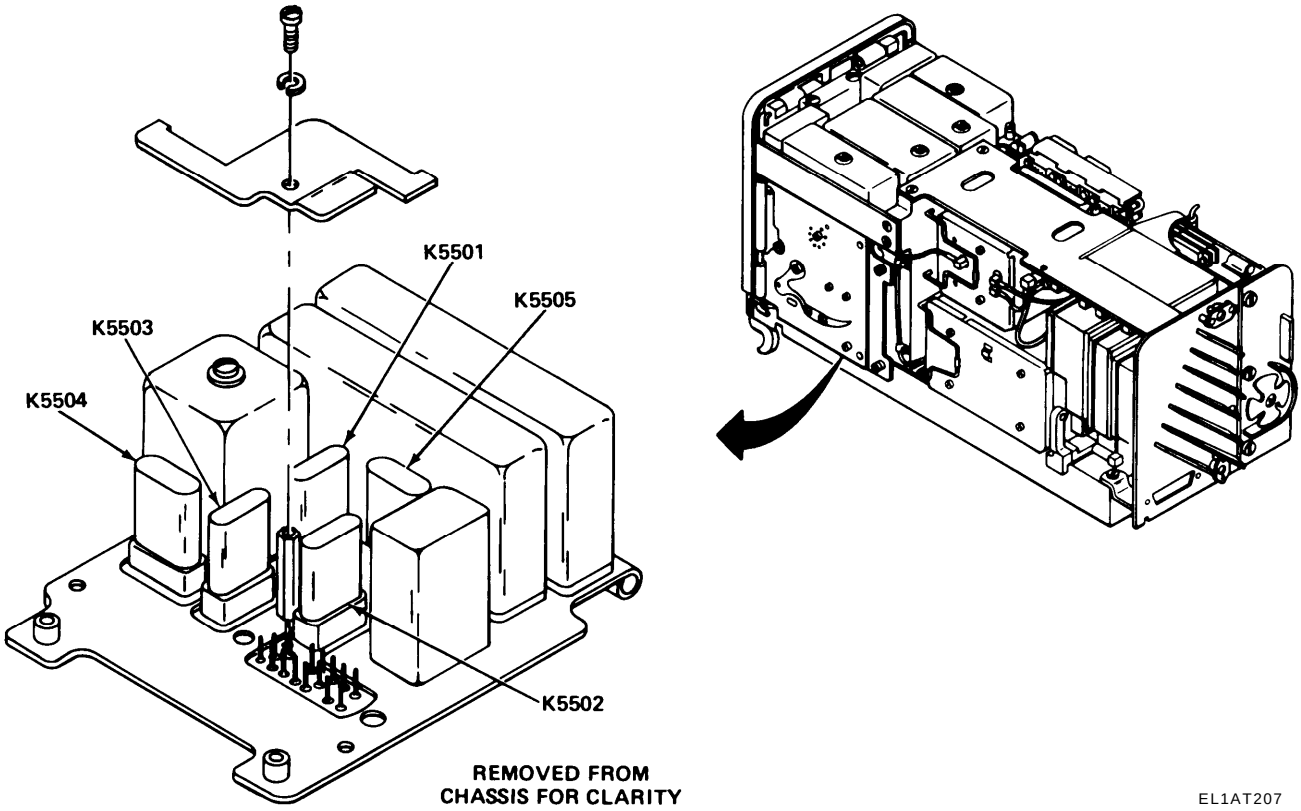

START
PER FORM TONE SQUELCH ADJUSTMENT (PARA 2-33).
ADJUSTMENT OK ?
NO
YES
CHECK FOR CONTINUITY BETWEEN PINS A1 AND A2 OF RELAY K5505. SEE ILLUSTRATION, SH 2.
0Ω ?
NO
YES
REPLACE RELAYS K5501 AND K5505 (PARA 2-44).
PERFORM TONE SQUELCH SENSITIVITY PERFOR- MANCE TEST (PARA 2-10).
REPLACE K5503, K5504, A5200, AND A5300 ONE AT A TIME.
SEE NOTES 1 AND 2.
1
1

NOTES

1. After replacing each unit, perform Tone Squelch Sensitivity Test (para 2-10) and if trouble is not corrected, replace units in sequence listed in flow chart.
2. If replacing module A5200, adjust in accordance with paragraph 2-33, then do Performance Test (para 2-10).

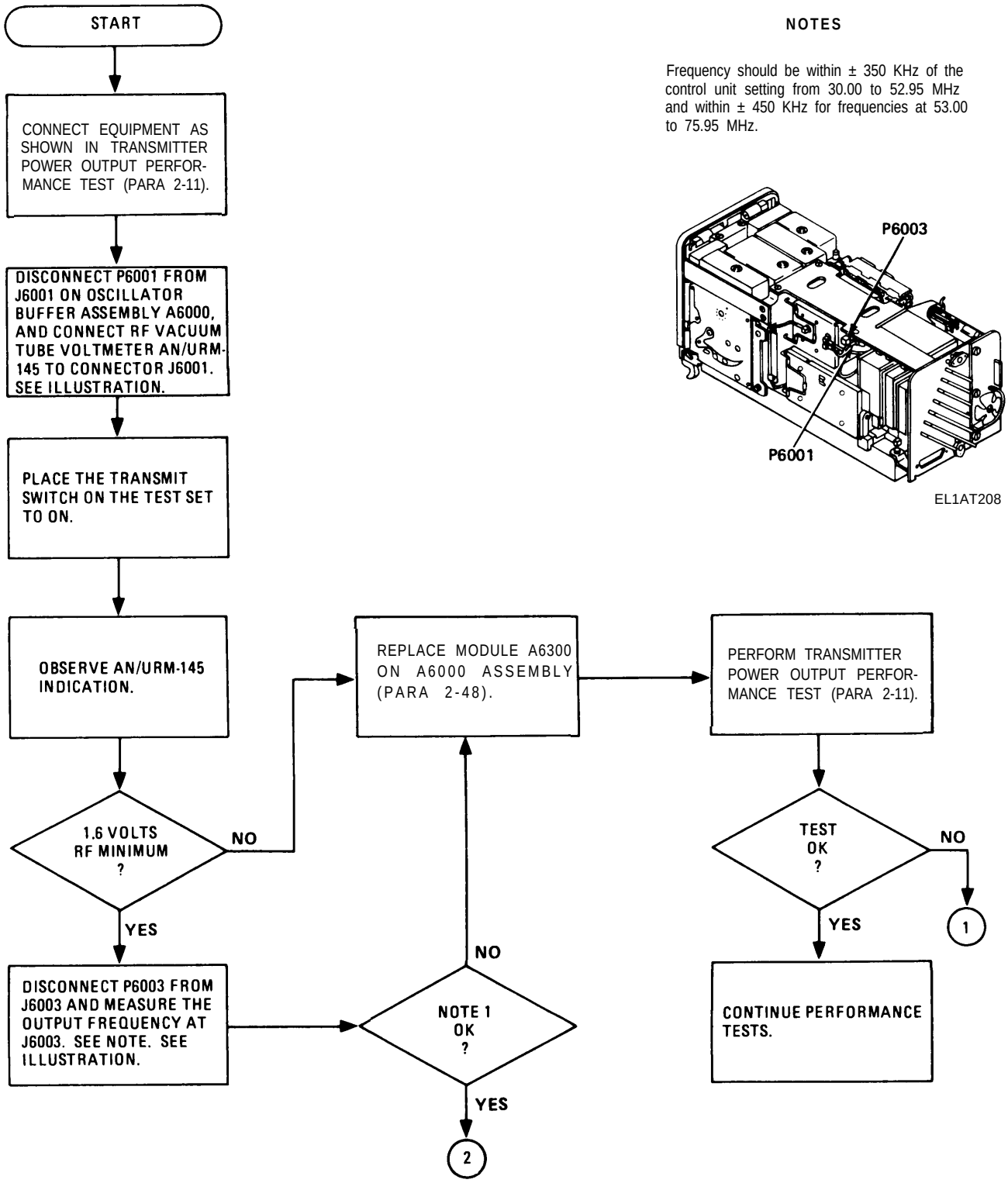
2-26. TROUBLESHOOTING CHARTS. (CONT)

CHART 2-12
Tone Squelch Sensitivity Troubleshooting
(Sheet 2 of 2)



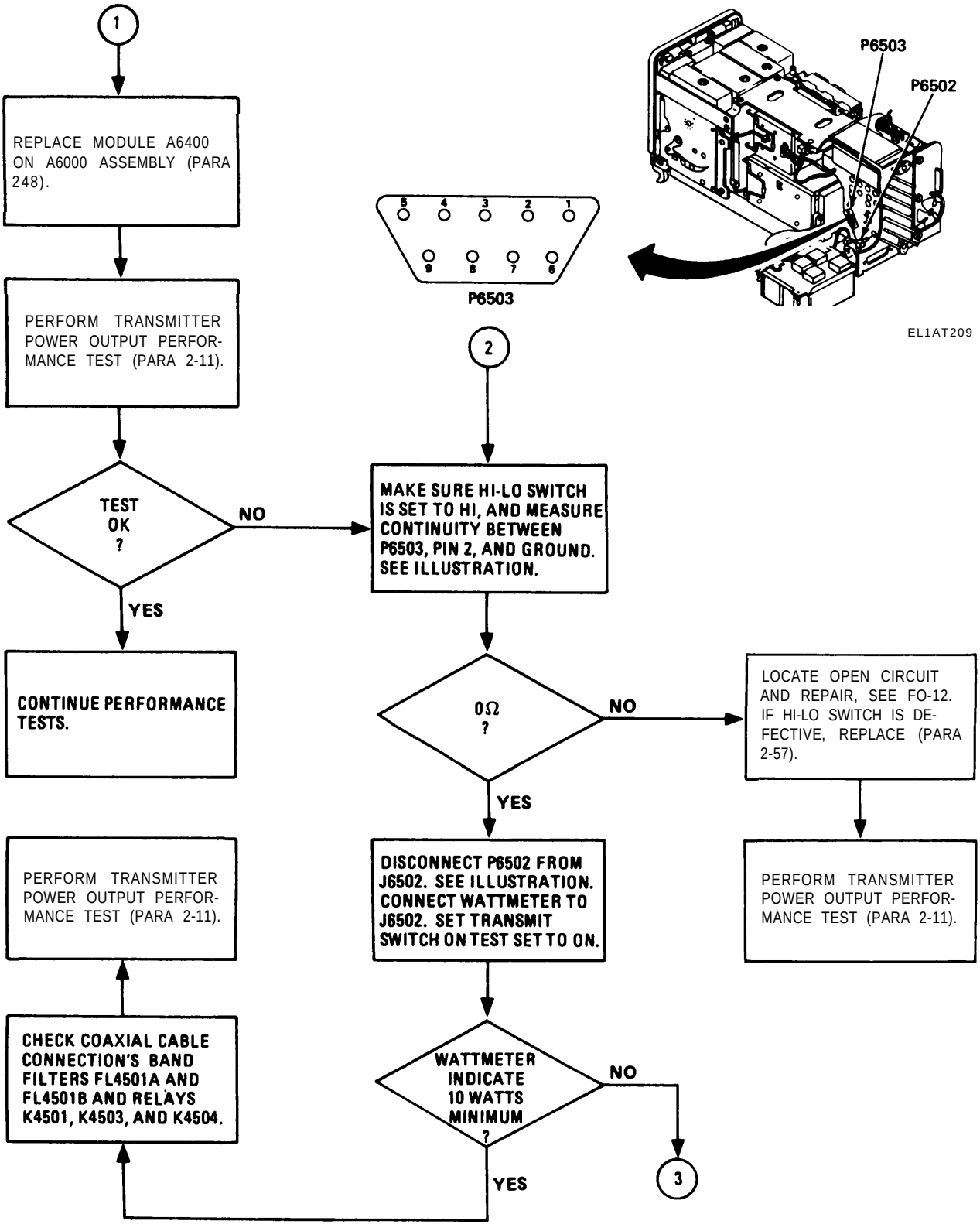
2-26. TROUBLESHOOTING CHARTS. (CONT)

CHART 2-13
Transmitter Power Output (HI) Troubleshooting
(Sheet 1 of 3)


START
CONNECT EQUIPMENT AS SHOWN IN TRANSMITTER POWER OUTPUT PERFORMANCE TEST (PARA 2-11).
DISCONNECT P6001 FROM J6001 ON OSCILLATOR BUFFER ASSEMBLY A6000, AND CONNECT RF VACUUM TUBE VOLTMETER AN/URM-145 TO CONNECTOR J6001. SEE ILLUSTRATION.
PLACE THE TRANSMIT SWITCH ON THE TEST SET TO ON.
OBSERVE AN/URM-145 INDICATION.
1.6 VOLTS RF MINIMUM ?
NO
YES
REPLACE MODULE A6300 ON A6000 ASSEMBLY (PARA 2-48).
DISCONNECT P6003 FROM J6003 AND MEASURE THE OUTPUT FREQUENCY AT J6003. SEE NOTE. SEE ILLUSTRATION.
NOTE 1 OK ?
NO
YES
2
PERFORM TRANSMITTER POWER OUTPUT PERFORMANCE TEST (PARA 2-11).
TEST OK ?
NO
YES
1
CONTINUE PERFORMANCE TESTS.
NOTES
Frequency should be within ± 350 KHz of the control unit setting from 30.00 to 52.95 MHz and within ± 450 KHz for frequencies at 53.00 to 75.95 MHz.
P6003
P6001
EL1AT208

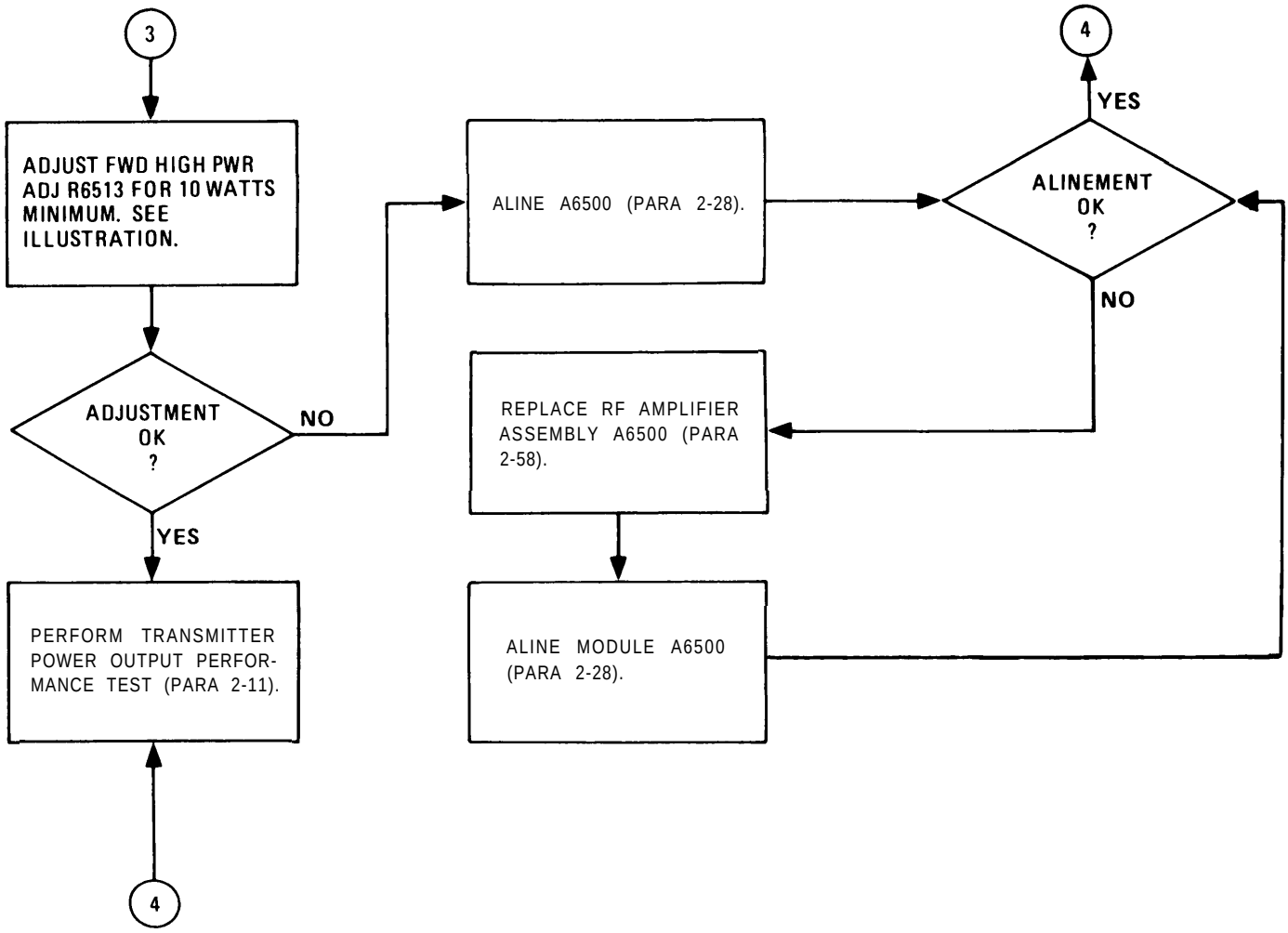
2-26. TROUBLESHOOTING CHARTS. (CONT)

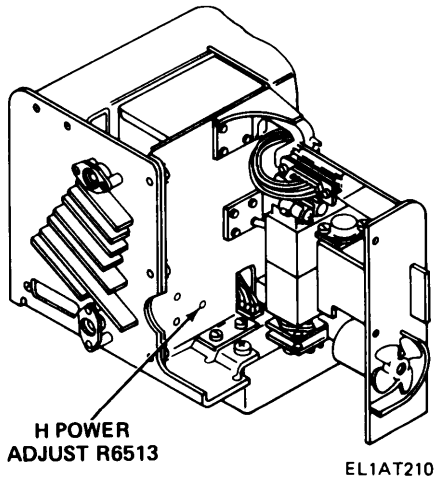
CHART 2-13
Transmitter Power Output (HI) Troubleshooting
(Sheet 2 of 3)


1
REPLACE MODULE A6400 ON A6000 ASSEMBLY (PARA 248).
PERFORM TRANSMITTER POWER OUTPUT PERFORMANCE TEST (PARA 2-11).
TEST OK ?
NO
YES
CONTINUE PERFORMANCE TESTS.
2
MAKE SURE HI-LO SWITCH IS SET TO HI, AND MEASURE CONTINUITY BETWEEN P6503, PIN 2, AND GROUND. SEE ILLUSTRATION.
0Ω ?
NO
YES
LOCATE OPEN CIRCUIT AND REPAIR, SEE FO-12. IF HI-LO SWITCH IS DEFECTIVE, REPLACE (PARA 2-57).
PERFORM TRANSMITTER POWER OUTPUT PERFORMANCE TEST (PARA 2-11).
DISCONNECT P6502 FROM J6502. SEE ILLUSTRATION. CONNECT WATTMETER TO J6502. SET TRANSMIT SWITCH ON TEST SET TO ON.
WATTMETER INDICATE 10 WATTS MINIMUM ?
NO
YES
3
CHECK COAXIAL CABLE CONNECTION'S BAND FILTERS FL4501A AND FL4501B AND RELAYS K4501, K4503, AND K4504.
PERFORM TRANSMITTER POWER OUTPUT PERFORMANCE TEST (PARA 2-11).
5 4 3 2 1
9 8 7 6
P6503
P6503
P6502
EL1AT209

2-26. TROUBLESHOOTING CHARTS. (CONT)

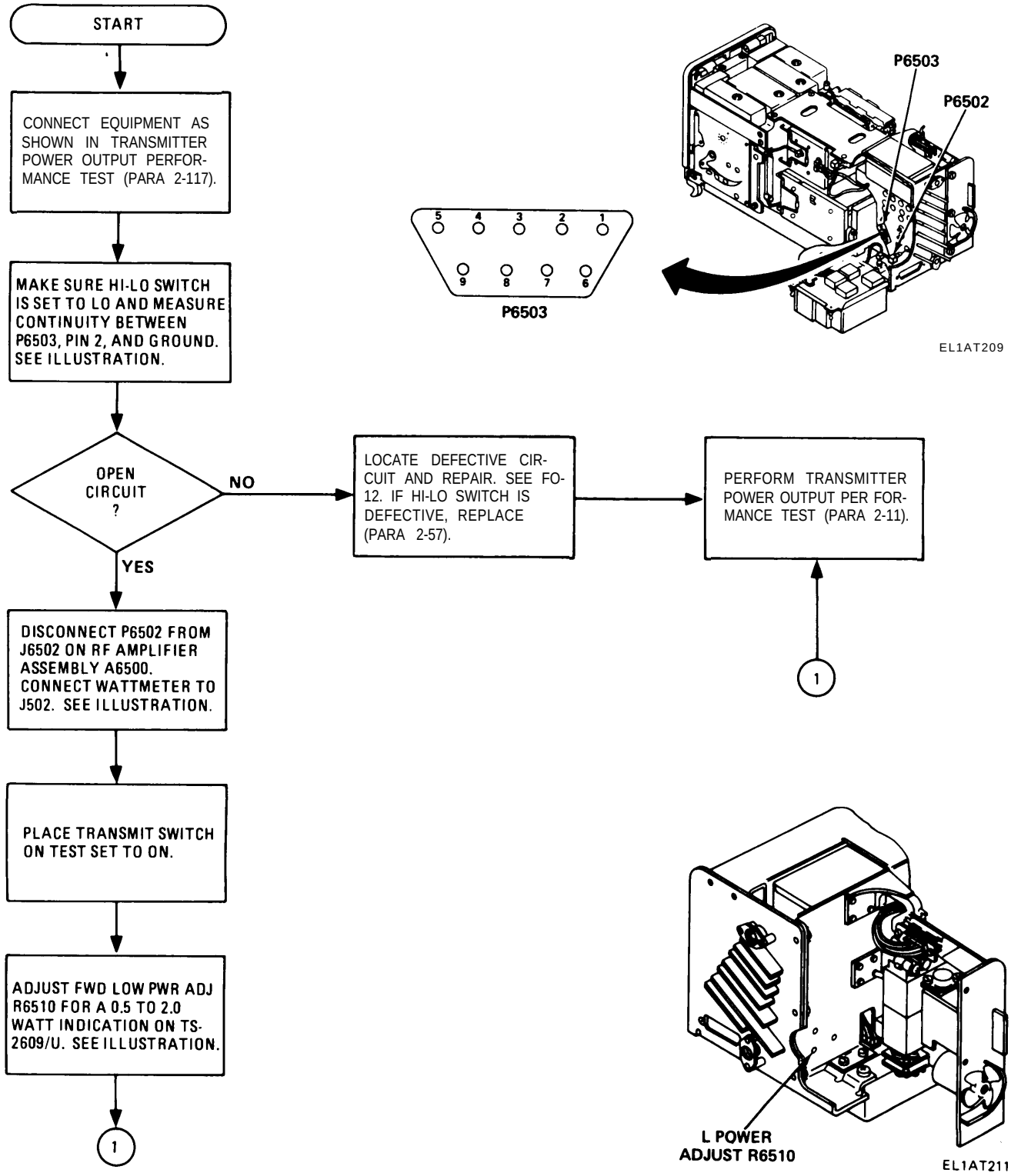
CHART 2-13
Transmitter Power Output (HI) Troubleshooting
(Sheet 3 of 3)





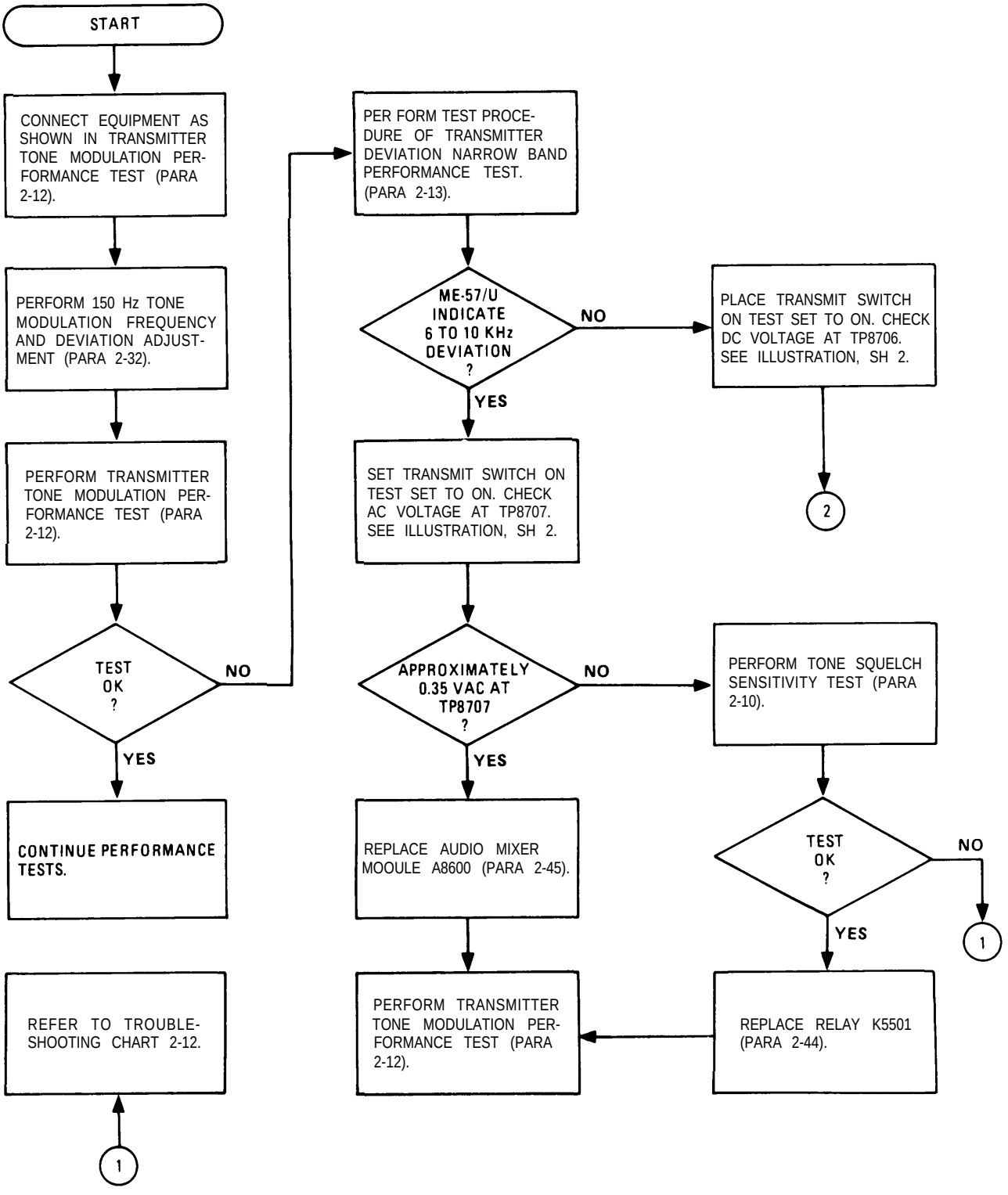
2-26. TROUBLESHOOTING CHARTS. (CONT)

CHART 2-14
Transmitter Power Output (LO) Troubleshooting


START
CONNECT EQUIPMENT AS SHOWN IN TRANSMITTER POWER OUTPUT PERFORMANCE TEST (PARA 2-117).
MAKE SURE HI-LO SWITCH IS SET TO LO AND MEASURE CONTINUITY BETWEEN P6503, PIN 2, AND GROUND. SEE ILLUSTRATION.
OPEN CIRCUIT ?
NO
YES
LOCATE DEFECTIVE CIRCUIT AND REPAIR. SEE FO-12. IF HI-LO SWITCH IS DEFECTIVE, REPLACE (PARA 2-57).
PERFORM TRANSMITTER POWER OUTPUT PER FORMANCE TEST (PARA 2-11).
DISCONNECT P6502 FROM J6502 ON RF AMPLIFIER ASSEMBLY A6500. CONNECT WATTMETER TO J502. SEE ILLUSTRATION.
PLACE TRANSMIT SWITCH ON TEST SET TO ON.
ADJUST FWD LOW PWR ADJ R6510 FOR A 0.5 TO 2.0 WATT INDICATION ON TS-2609/U. SEE ILLUSTRATION.
1
5 4 3 2 1
9 8 7 6
P6503
P6503
P6502
EL1AT209
L POWER ADJUST R6510
EL1AT211

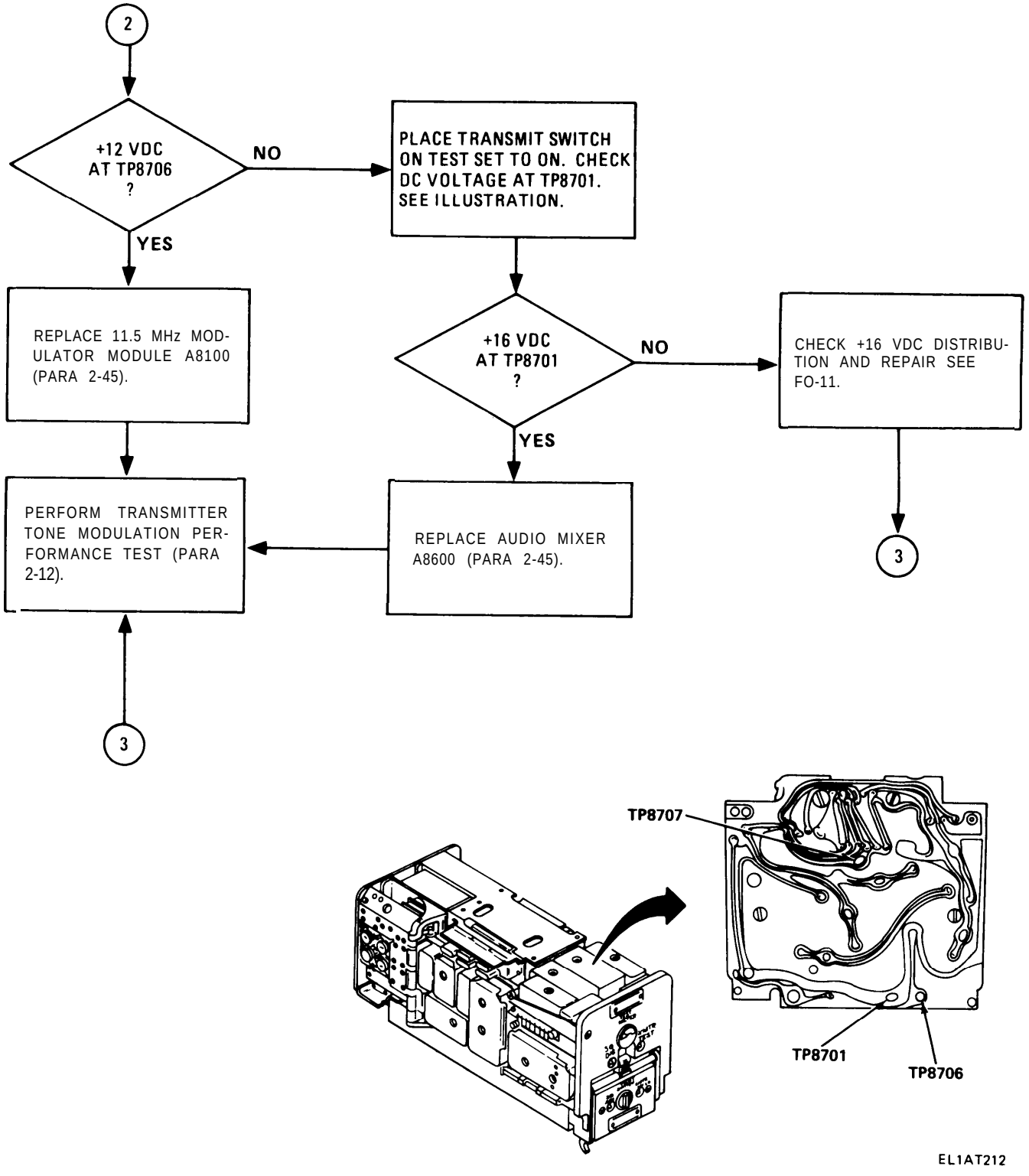
2-26. TROUBLESHOOTING CHARTS. (CONT)

CHART 2-15
Transmitter Tone Modulation Troubleshooting
(Sheet 1 of 2)


START
CONNECT EQUIPMENT AS SHOWN IN TRANSMITTER TONE MODULATION PERFORMANCE TEST (PARA 2-12).
PERFORM 150 Hz TONE MODULATION FREQUENCY AND DEVIATION ADJUSTMENT (PARA 2-32).
PERFORM TRANSMITTER TONE MODULATION PERFORMANCE TEST (PARA 2-12).
TEST OK ?
NO
YES
CONTINUE PERFORMANCE TESTS.
REFER TO TROUBLESHOOTING CHART 2-12.
1
PER FORM TEST PROCEDURE OF TRANSMITTER DEVIATION NARROW BAND PERFORMANCE TEST. (PARA 2-13).
ME-57/U INDICATE 6 TO 10 KHz DEVIATION ?
NO
YES
PLACE TRANSMIT SWITCH ON TEST SET TO ON. CHECK DC VOLTAGE AT TP8706. SEE ILLUSTRATION, SH 2.
2
SET TRANSMIT SWITCH ON TEST SET TO ON. CHECK AC VOLTAGE AT TP8707. SEE ILLUSTRATION, SH 2.
APPROXIMATELY 0.35 VAC AT TP8707 ?
NO
YES
PERFORM TONE SQUELCH SENSITIVITY TEST (PARA 2-10).
REPLACE AUDIO MIXER MOOULE A8600 (PARA 2-45).
TEST OK ?
NO
YES
1
REPLACE RELAY K5501 (PARA 2-44).
PERFORM TRANSMITTER TONE MODULATION PERFORMANCE TEST (PARA 2-12).

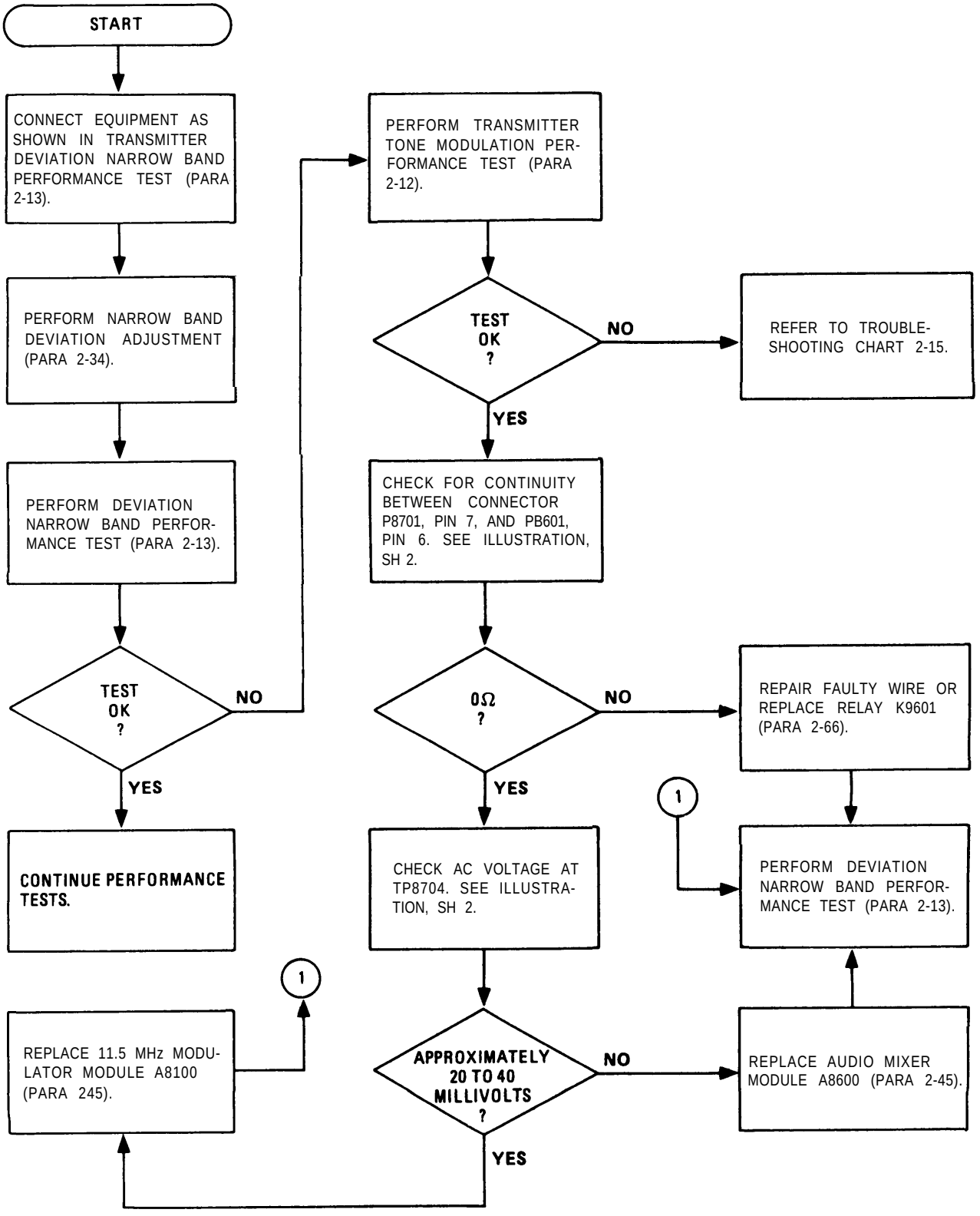
2-26. TROUBLESHOOTING CHARTS. (CONT)

CHART 2-15
Transmitter Tone Modulation Troubleshooting
(Sheet 2 of 2)



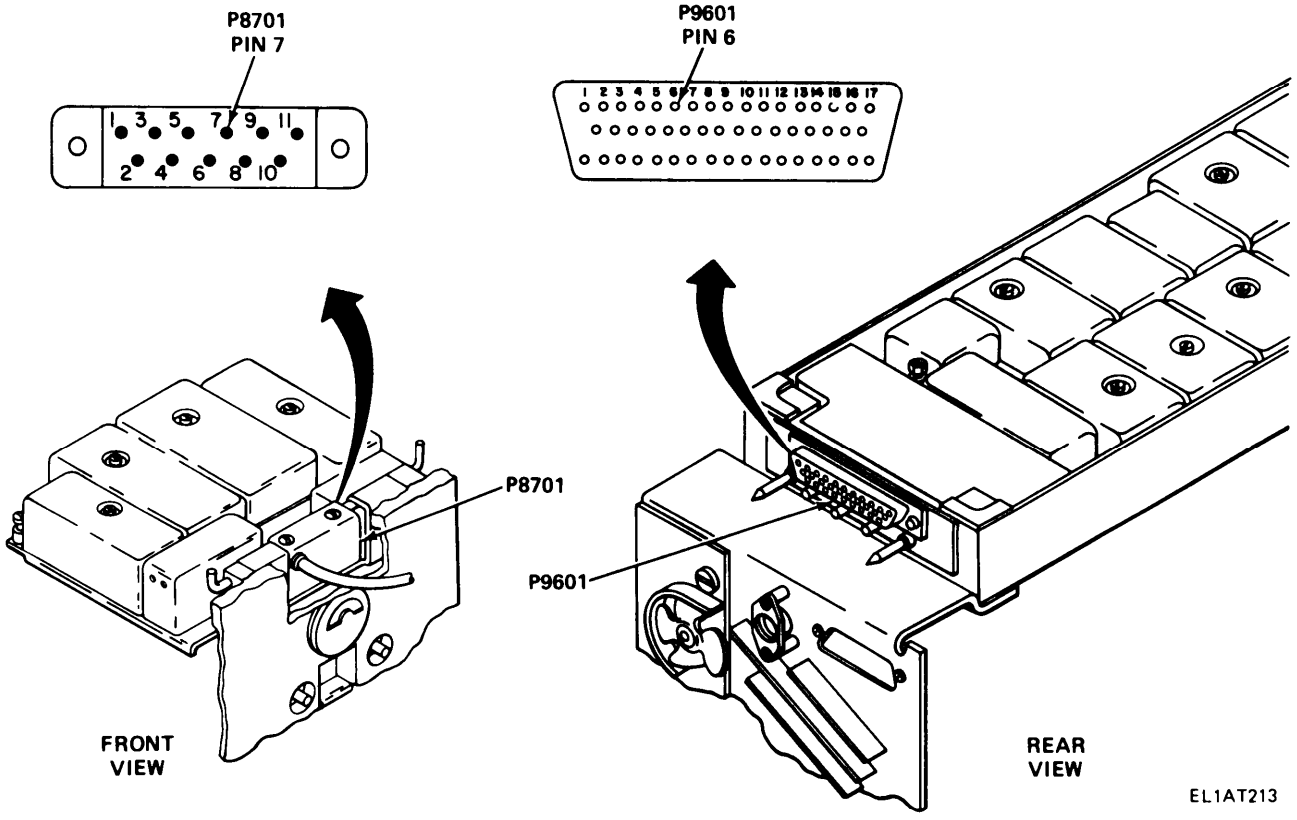
2-26. TROUBLESHOOTING CHARTS. (CONT)

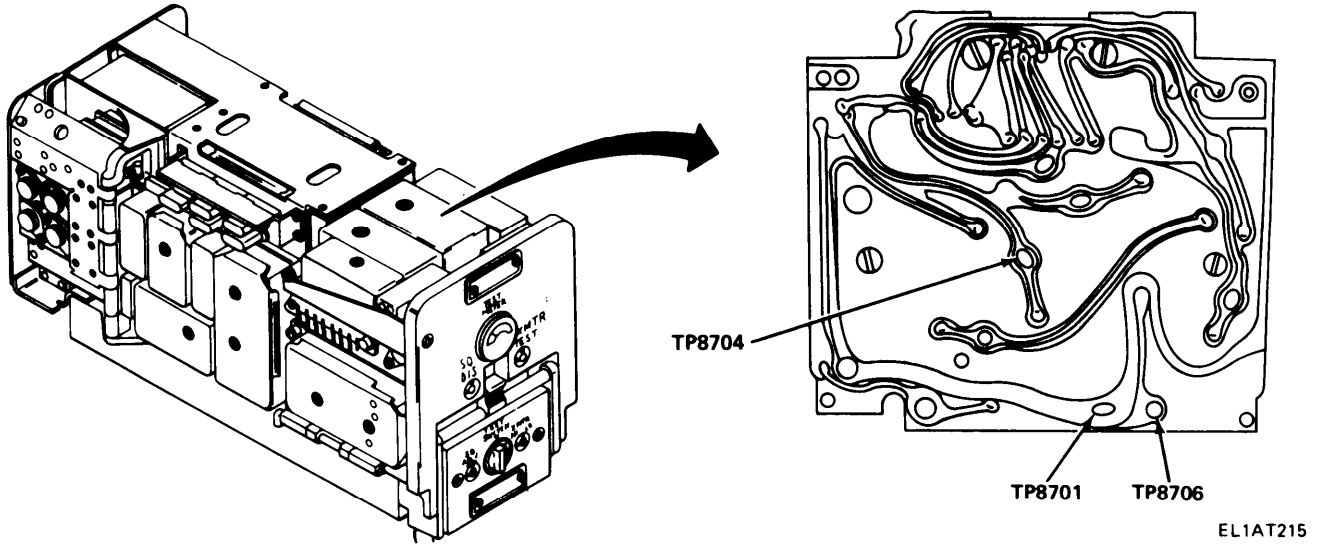
CHART 2-16
Transmitter Deviation Narrow Band Troubleshooting
(Sheet 1 of 2)


START
CONNECT EQUIPMENT AS SHOWN IN TRANSMITTER DEVIATION NARROW BAND PERFORMANCE TEST (PARA 2-13).
PERFORM NARROW BAND DEVIATION ADJUSTMENT (PARA 2-34).
PERFORM DEVIATION NARROW BAND PERFORMANCE TEST (PARA 2-13).
TEST OK ?
NO
YES
CONTINUE PERFORMANCE TESTS.
REPLACE 11.5 MHz MODULATOR MODULE A8100 (PARA 245).
1
PERFORM TRANSMITTER TONE MODULATION PERFORMANCE TEST (PARA 2-12).
TEST OK ?
NO
REFER TO TROUBLESHOOTING CHART 2-15.
YES
CHECK FOR CONTINUITY BETWEEN CONNECTOR P8701, PIN 7, AND PB601, PIN 6. SEE ILLUSTRATION, SH 2.
0Ω ?
NO
REPAIR FAULTY WIRE OR REPLACE RELAY K9601 (PARA 2-66).
YES
CHECK AC VOLTAGE AT TP8704. SEE ILLUSTRATION, SH 2.
1
PERFORM DEVIATION NARROW BAND PERFORMANCE TEST (PARA 2-13).
APPROXIMATELY 20 TO 40 MILLIVOLTS ?
NO
REPLACE AUDIO MIXER MODULE A8600 (PARA 2-45).
YES

2-26. TROUBLESHOOTING CHARTS. (CONT)

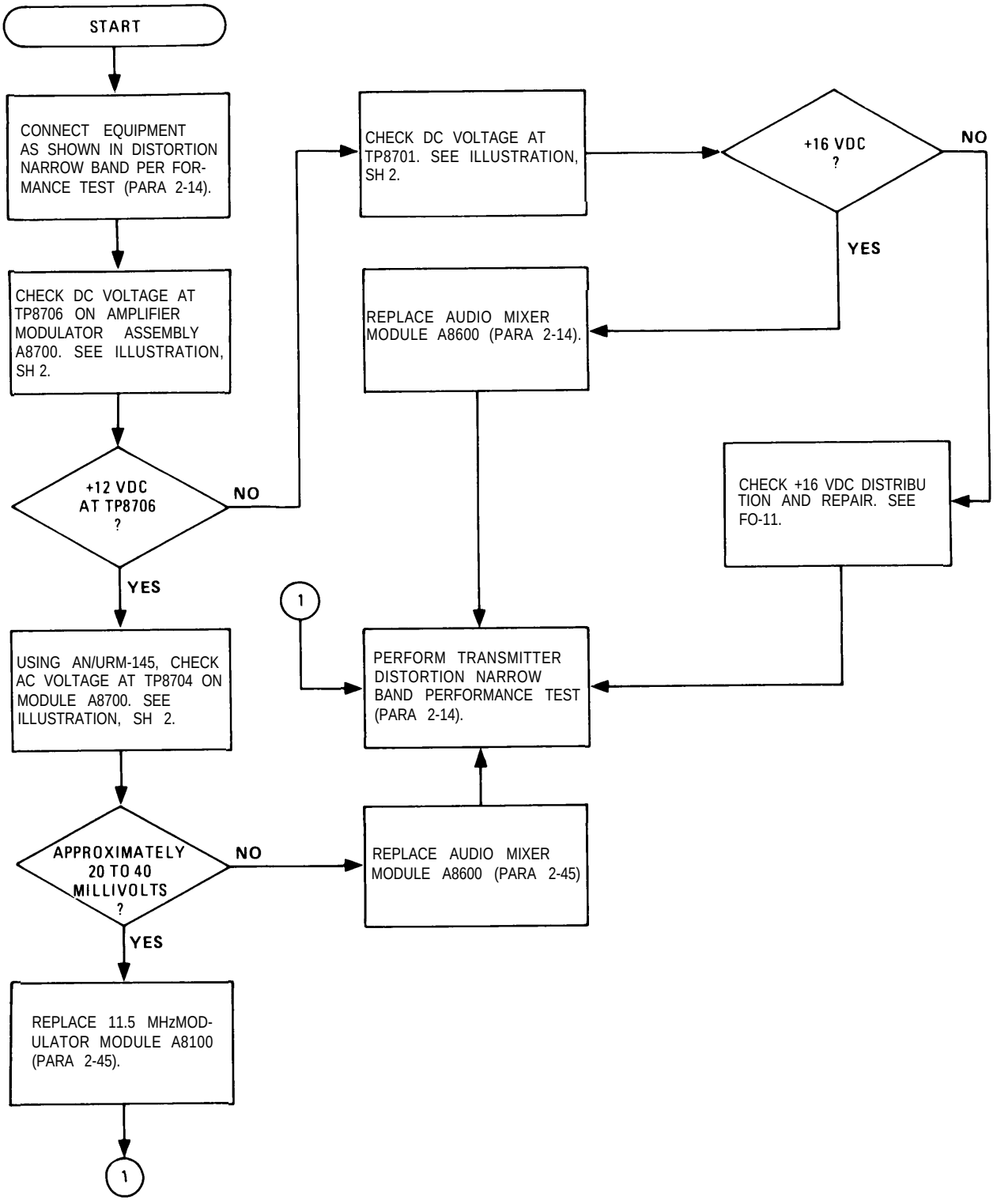
CHART 2-16
Transmitter Deviation Narrow Band Troubleshooting
(Sheet 2 of 2)





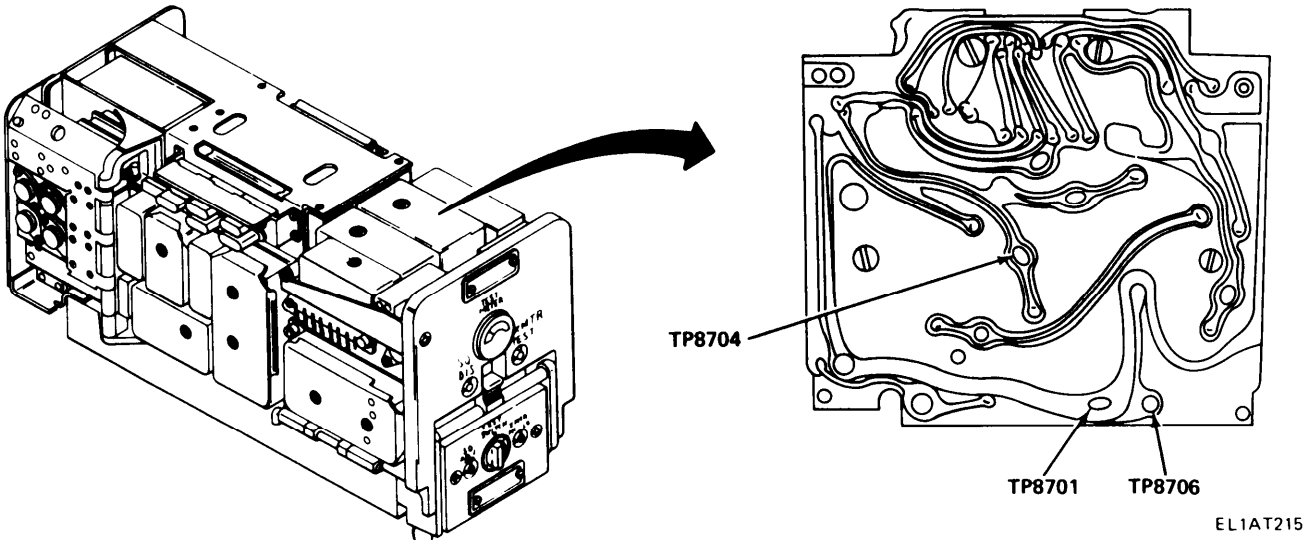
2-26. TROUBLESHOOTING CHARTS. (CONT)

CHART 2-17
Transmitter Distortion Narrow Band Troubleshooting
(Sheet 1 of 2)


START
CONNECT EQUIPMENT AS SHOWN IN DISTORTION NARROW BAND PER FOR-MANCE TEST (PARA 2-14).
CHECK DC VOLTAGE AT TP8706 ON AMPLIFIER MODULATOR ASSEMBLY A8700. SEE ILLUSTRATION, SH 2.
+12 VDC AT TP8706 ?
NO
YES
CHECK DC VOLTAGE AT TP8701. SEE ILLUSTRATION, SH 2.
+16 VDC ?
NO
YES
REPLACE AUDIO MIXER MODULE A8600 (PARA 2-14).
CHECK +16 VDC DISTRIBU TION AND REPAIR. SEE FO-11.
1
USING AN/URM-145, CHECK AC VOLTAGE AT TP8704 ON MODULE A8700. SEE ILLUSTRATION, SH 2.
PERFORM TRANSMITTER DISTORTION NARROW BAND PERFORMANCE TEST (PARA 2-14).
APPROXIMATELY 20 TO 40 MILLIVOLTS ?
NO
YES
REPLACE AUDIO MIXER MODULE A8600 (PARA 2-45)
REPLACE 11.5 MHzMOD-ULATOR MODULE A8100 (PARA 2-45).
1

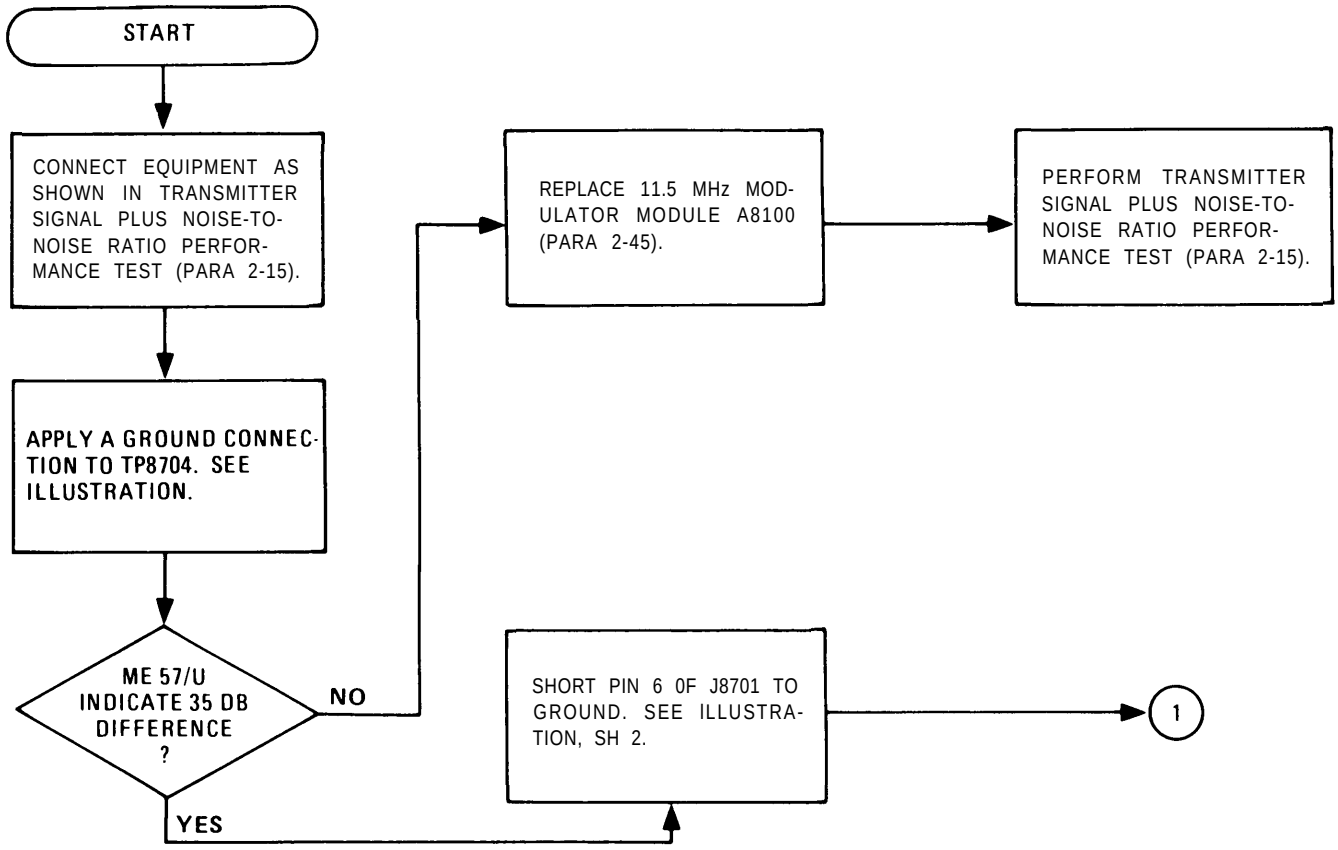
2-26. TROUBLESHOOTING CHARTS. (CONT)

CHART 2-17
Transmitter Distortion Narrow Band Troubleshooting
(Sheet 2 of 2)



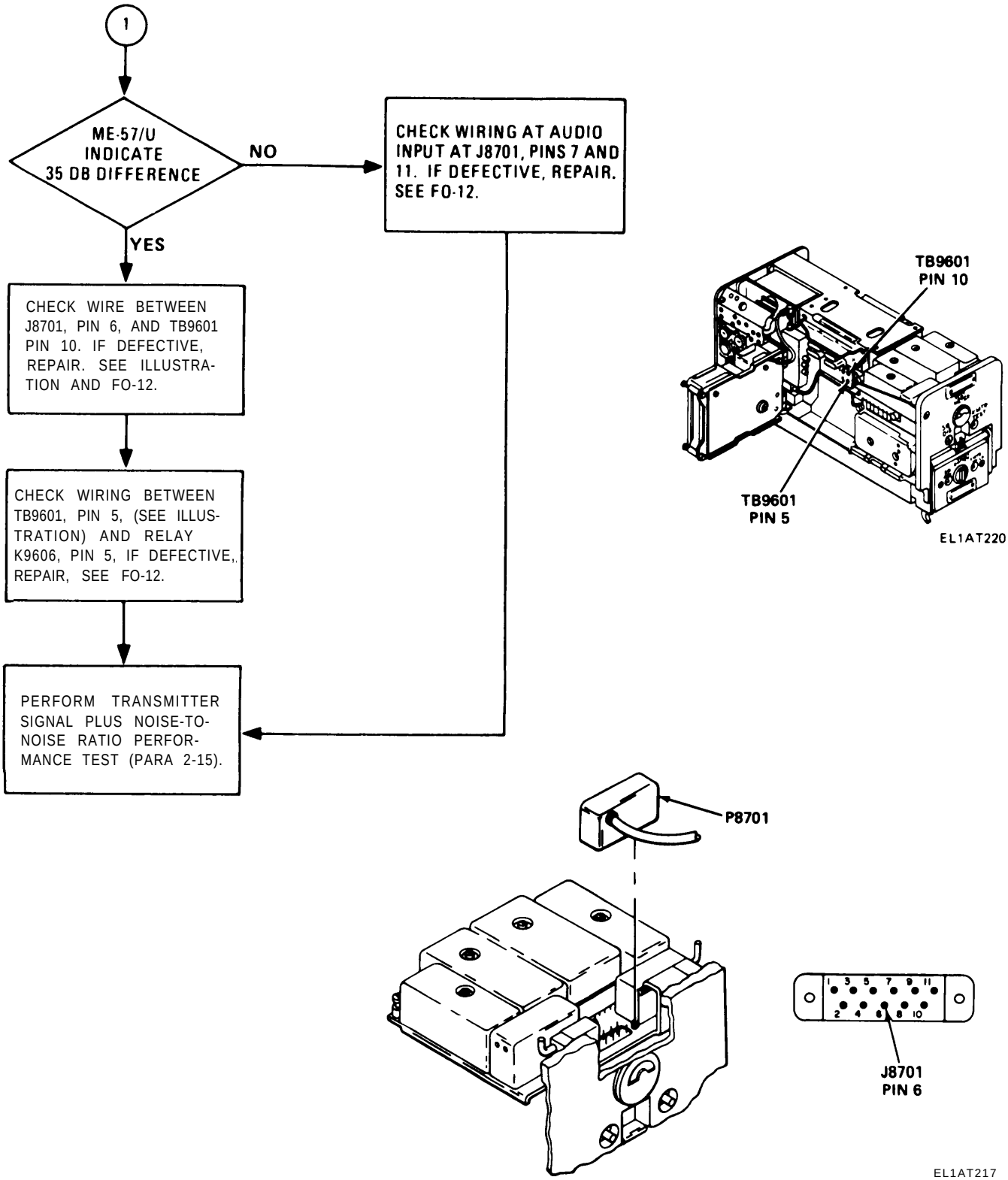
2-26. TROUBLESHOOTING CHARTS. (CONT)

CHART 2-18
Maximum Signal Plus Noise-to-Noise Ratio Troubleshooting
(Sheet 1 of 2)


START
CONNECT EQUIPMENT AS SHOWN IN TRANSMITTER SIGNAL PLUS NOISE-TO-NOISE RATIO PERFORMANCE TEST (PARA 2-15).
APPLY A GROUND CONNECTION TO TP8704. SEE ILLUSTRATION.
ME 57/U INDICATE 35 DB DIFFERENCE ?
NO
YES
REPLACE 11.5 MHz MODULATOR MODULE A8100 (PARA 2-45).
PERFORM TRANSMITTER SIGNAL PLUS NOISE-TO-NOISE RATIO PERFORMANCE TEST (PARA 2-15).
SHORT PIN 6 0F J8701 TO GROUND. SEE ILLUSTRATION, SH 2.
1
TP8704
EL1AT216

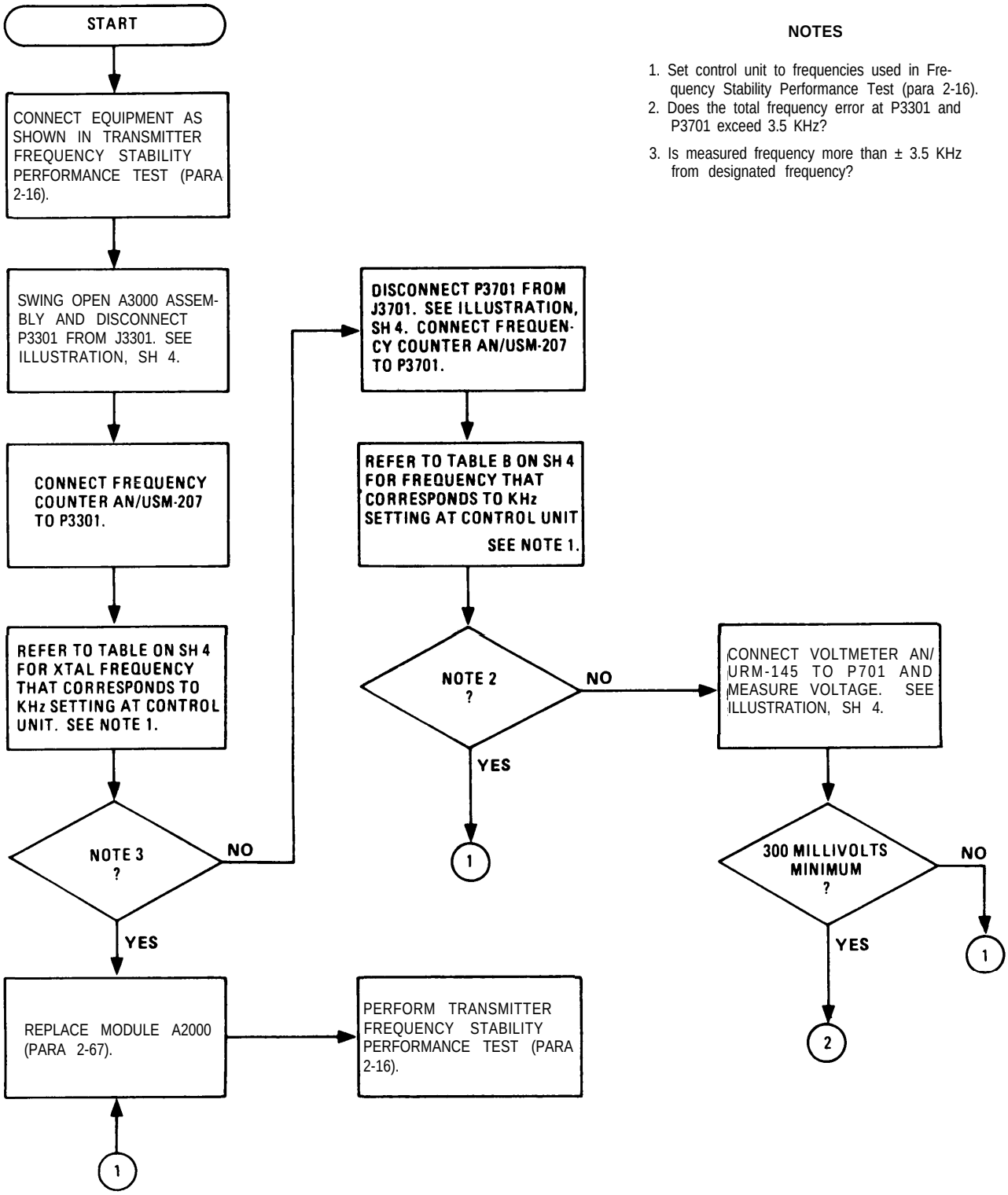
2-26. TROUBLESHOOTING CHARTS. (CONT)

CHART 2-18
Maximum Signal Plus Noise-to-Noise Ratio Troubleshooting
(Sheet 2 of 2)


1
ME-57/U INDICATE 35 DB DIFFERENCE
NO
CHECK WIRING AT AUDIO INPUT AT J8701, PINS 7 AND 11. IF DEFECTIVE, REPAIR. SEE FO-12.
YES
CHECK WIRE BETWEEN J8701, PIN 6, AND TB9601 PIN 10. IF DEFECTIVE, REPAIR. SEE ILLUSTRATION AND FO-12.
CHECK WIRING BETWEEN TB9601, PIN 5, (SEE ILLUSTRATION) AND RELAY K9606, PIN 5, IF DEFECTIVE, REPAIR, SEE FO-12.
PERFORM TRANSMITTER SIGNAL PLUS NOISE-TO-NOISE RATIO PERFORMANCE TEST (PARA 2-15).
TB9601 PIN 10
TB9601 PIN 5
EL1AT220
P8701
J8701 PIN 6
EL1AT217

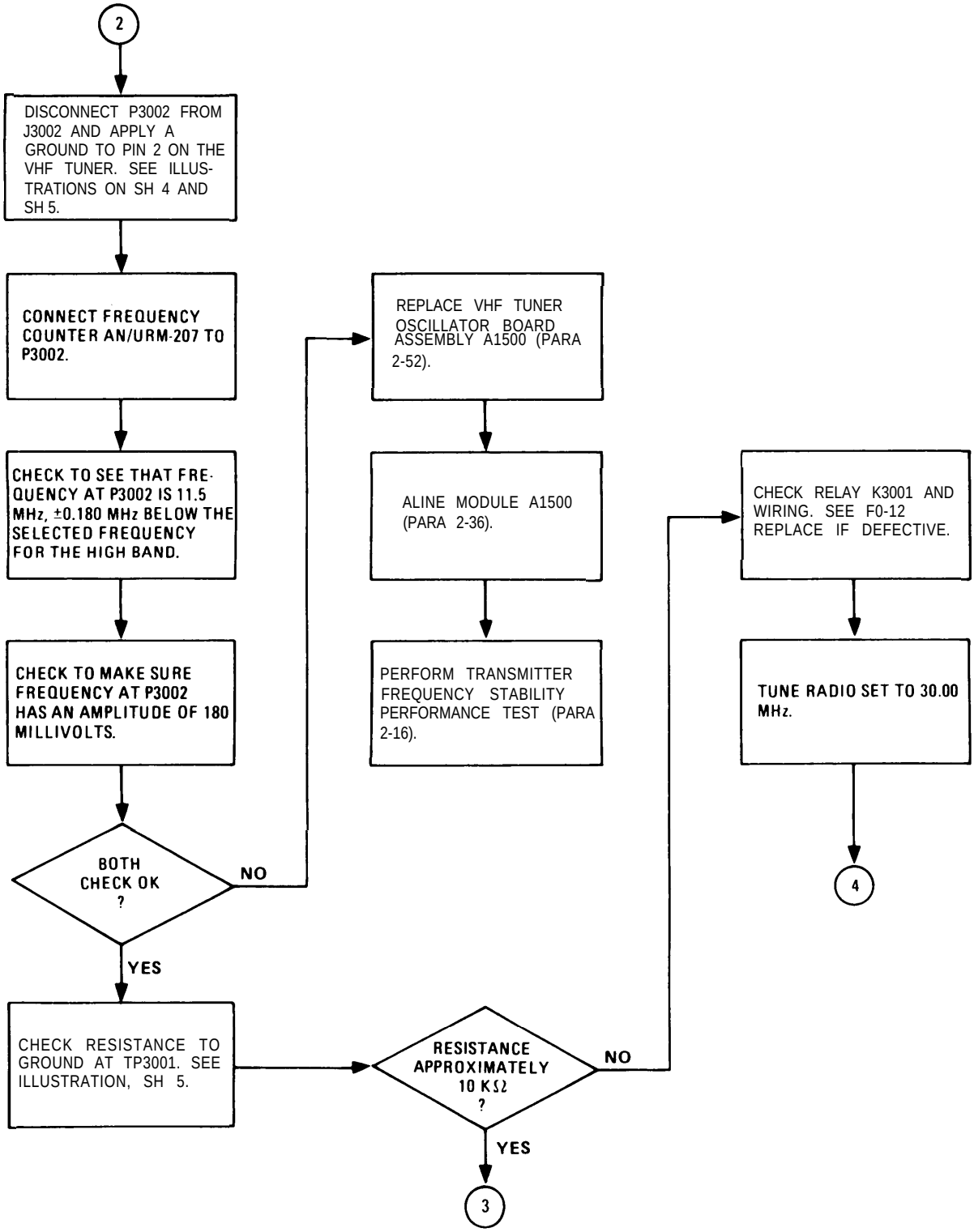
2-26. TROUBLESHOOTING CHARTS. (CONT)

CHART 2-19
Transmitter Frequency Stability Troubleshooting
(Sheet 1 of 5)


START
CONNECT EQUIPMENT AS SHOWN IN TRANSMITTER FREQUENCY STABILITY PERFORMANCE TEST (PARA 2-16).
SWING OPEN A3000 ASSEMBLY AND DISCONNECT P3301 FROM J3301. SEE ILLUSTRATION, SH 4.
CONNECT FREQUENCY COUNTER AN/USM-207 TO P3301.
REFER TO TABLE ON SH 4 FOR XTAL FREQUENCY THAT CORRESPONDS TO KHz SETTING AT CONTROL UNIT. SEE NOTE 1.
NOTE 3 ?
NO
YES
REPLACE MODULE A2000 (PARA 2-67).
1
DISCONNECT P3701 FROM J3701. SEE ILLUSTRATION, SH 4. CONNECT FREQUENCY COUNTER AN/USM-207 TO P3701.
REFER TO TABLE B ON SH 4 FOR FREQUENCY THAT CORRESPONDS TO KHz SETTING AT CONTROL UNIT SEE NOTE 1.
NOTE 2 ?
NO
YES
1
PERFORM TRANSMITTER FREQUENCY STABILITY PERFORMANCE TEST (PARA 2-16).
CONNECT VOLTMETER AN/URM-145 TO P701 AND MEASURE VOLTAGE. SEE ILLUSTRATION, SH 4.
300 MILLIVOLTS MINIMUM ?
NO
YES
1
2
NOTES
1. Set control unit to frequencies used in Frequency Stability Performance Test (para 2-16).
2. Does the total frequency error at P3301 and P3701 exceed 3.5 KHz?
3. Is measured frequency more than ± 3.5 KHz from designated frequency?

2-26. TROUBLESHOOTING CHARTS. (CONT)

CHART 2-19
Transmitter Frequency Stability Troubleshooting
(Sheet 2 of 5)


2
DISCONNECT P3002 FROM J3002 AND APPLY A GROUND TO PIN 2 ON THE VHF TUNER. SEE ILLUSTRATIONS ON SH 4 AND SH 5.
CONNECT FREQUENCY COUNTER AN/URM-207 TO P3002.
CHECK TO SEE THAT FREQUENCY AT P3002 IS 11.5 MHz, ±0.180 MHz BELOW THE SELECTED FREQUENCY FOR THE HIGH BAND.
CHECK TO MAKE SURE FREQUENCY AT P3002 HAS AN AMPLITUDE OF 180 MILLIVOLTS.
BOTH CHECK OK ?
NO
YES
REPLACE VHF TUNER OSCILLATOR BOARD ASSEMBLY A1500 (PARA 2-52).
ALINE MODULE A1500 (PARA 2-36).
PERFORM TRANSMITTER FREQUENCY STABILITY PERFORMANCE TEST (PARA 2-16).
CHECK RESISTANCE TO GROUND AT TP3001. SEE ILLUSTRATION, SH 5.
RESISTANCE APPROXIMATELY 10 KΩ ?
NO
YES
3
CHECK RELAY K3001 AND WIRING. SEE F0-12 REPLACE IF DEFECTIVE.
TUNE RADIO SET TO 30.00 MHz.
4

2-26. TROUBLESHOOTING CHARTS. (CONT)

CHART 2-19
Transmitter Frequency Stability Troubleshooting
(Sheet 3 of 5)

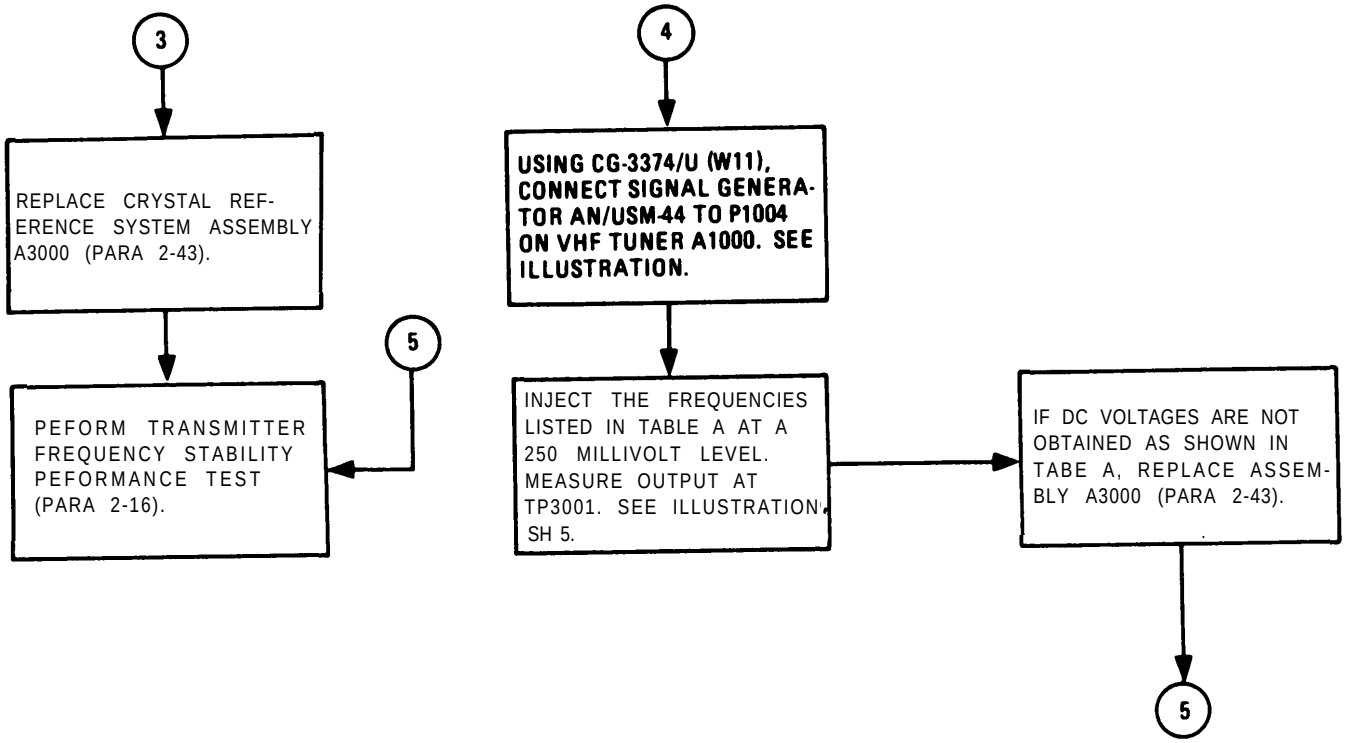

3
REPLACE CRYSTAL REFERENCE SYSTEM ASSEMBLY A3000 (PARA 2-43).
5
PEFORM TRANSMITTER FREQUENCY STABILITY PEFORMANCE TEST (PARA 2-16).
4
USING CG-3374/U (W11), CONNECT SIGNAL GENERATOR AN/USM-44 TO P1004 ON VHF TUNER A1000. SEE ILLUSTRATION.
INJECT THE FREQUENCIES LISTED IN TABLE A AT A 250 MILLIVOLT LEVEL. MEASURE OUTPUT AT TP3001. SEE ILLUSTRATION, SH 5.
IF DC VOLTAGES ARE NOT OBTAINED AS SHOWN IN TABE A, REPLACE ASSEMBLY A3000 (PARA 2-43).
5

TABLE A

FREQUENCY (MHz)	OUTPUT VDC
42.050	-2.4 TO - .4
42.250	-2.5 TO -2.0
42.350	-1.8 TO 1.2
42.450	-0.70 TO - .40
41.500	-0.15 TO + 0.15
41.600	+0.95 TO 1.45
41.700	+1.5 TO 2.5
41.900	+1.4 TO 2.4

2-26. TROUBLESHOOTING CHARTS. (CONT)

CHART 2-19
Transmitter Frequency Stability Troubleshooting
(Sheet 4 of 5)

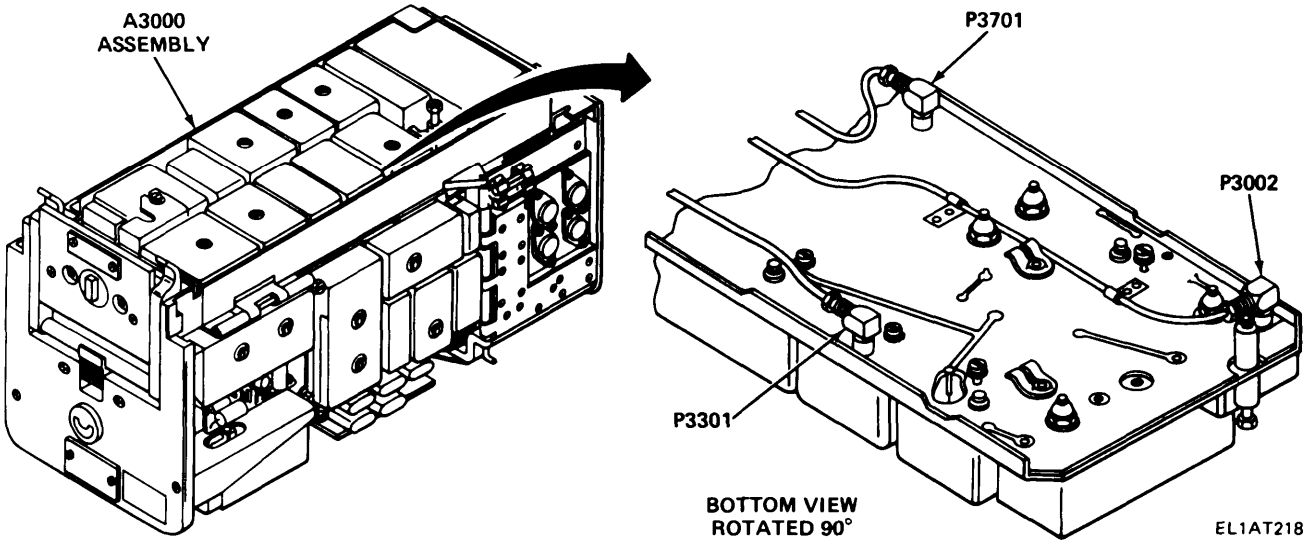
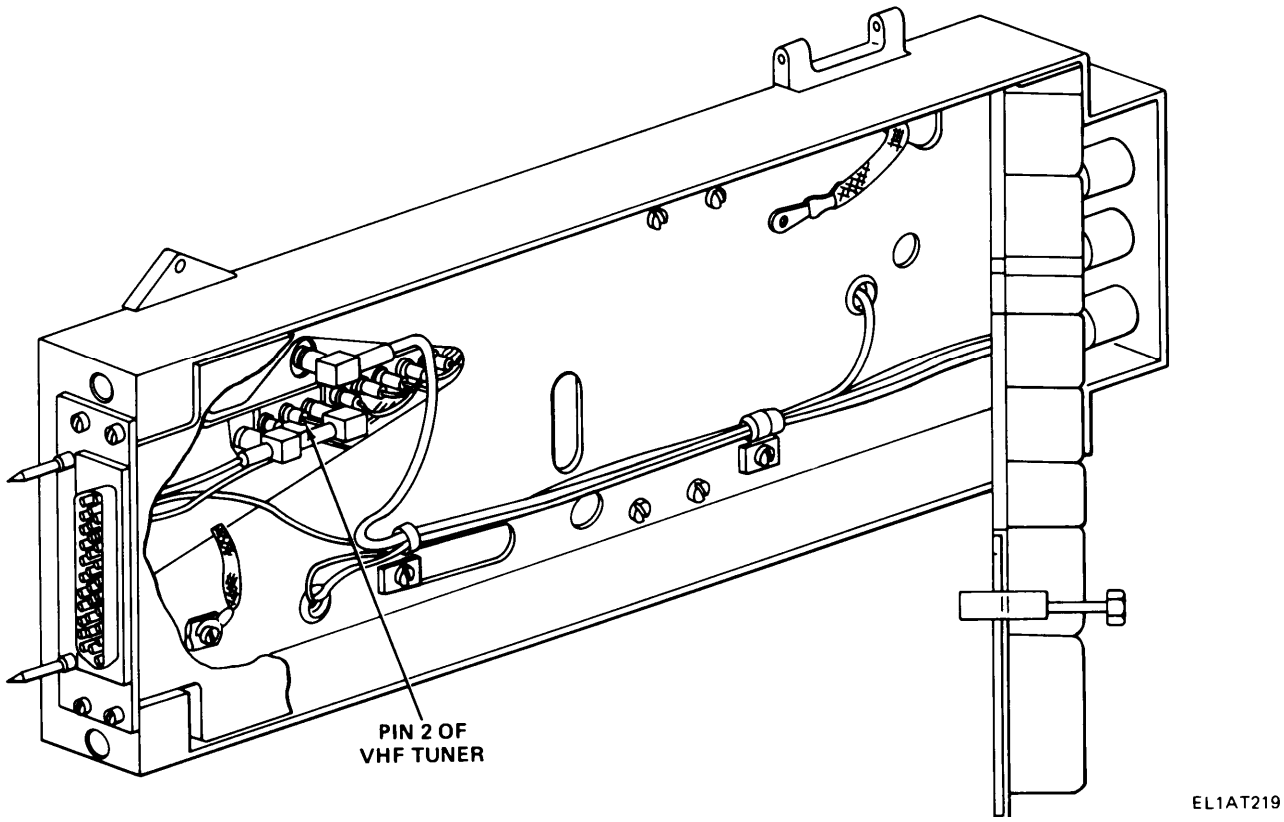


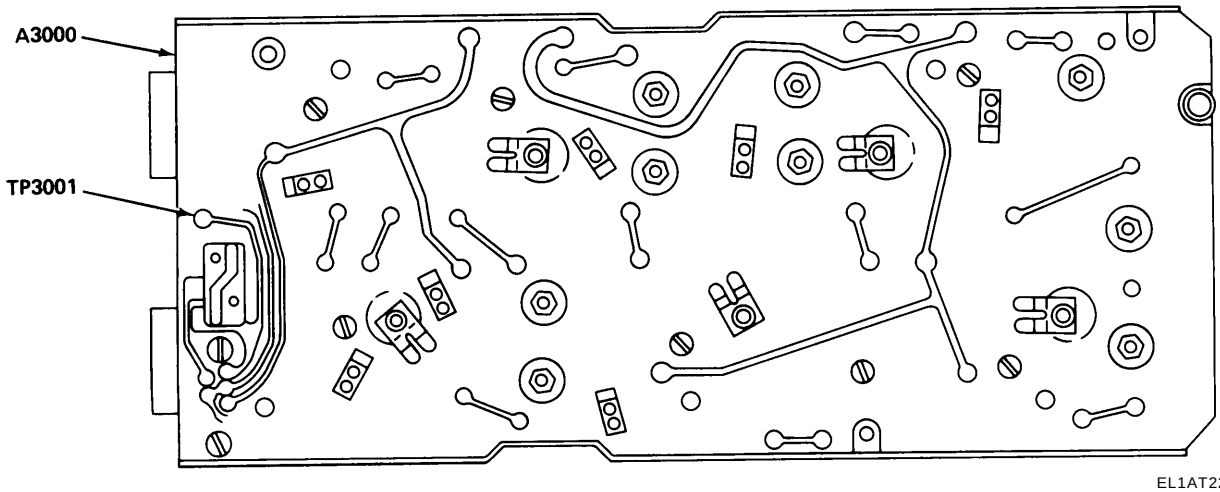
TABLE B

Last two digits of freq sel	Interpolation osc		Reference osc	
	Xtal	Freq (MHz)	Xtal	Freq (MHz)
00	Y2006	46.850	Y2012	5.65
05	Y2007	46.950	Y2011	5.60
10	Y2007	46.950	Y2012	5.65
15	Y2008	47.050	Y2011	5.60
20	Y2008	47.050	Y2012	5.65
25	Y2009	47.150	Y2011	5.60
30	Y2009	47.150	Y2012	5.65
35	Y2010	47.250	Y2011	5.60
40	Y2010	47.250	Y2012	5.65
45	Y2005	47.350	Y2011	5.60
50	Y2005	47.350	Y2012	5.65
55	Y2004	47.450	Y2011	5.60
60	Y2004	47.450	Y2012	5.65
65	Y2003	47.550	Y2011	5.60
70	Y2003	47.550	Y2012	5.65
75	Y2002	47.650	Y2011	5.60
80	Y2002	47.650	Y2012	5.65
85	Y2001	47.750	Y2011	5.60
90	Y2001	47.750	Y2012	5.65
95	Y2006	46.850	Y2012	5.65

2-26. TROUBLESHOOTING CHARTS. (CONT)

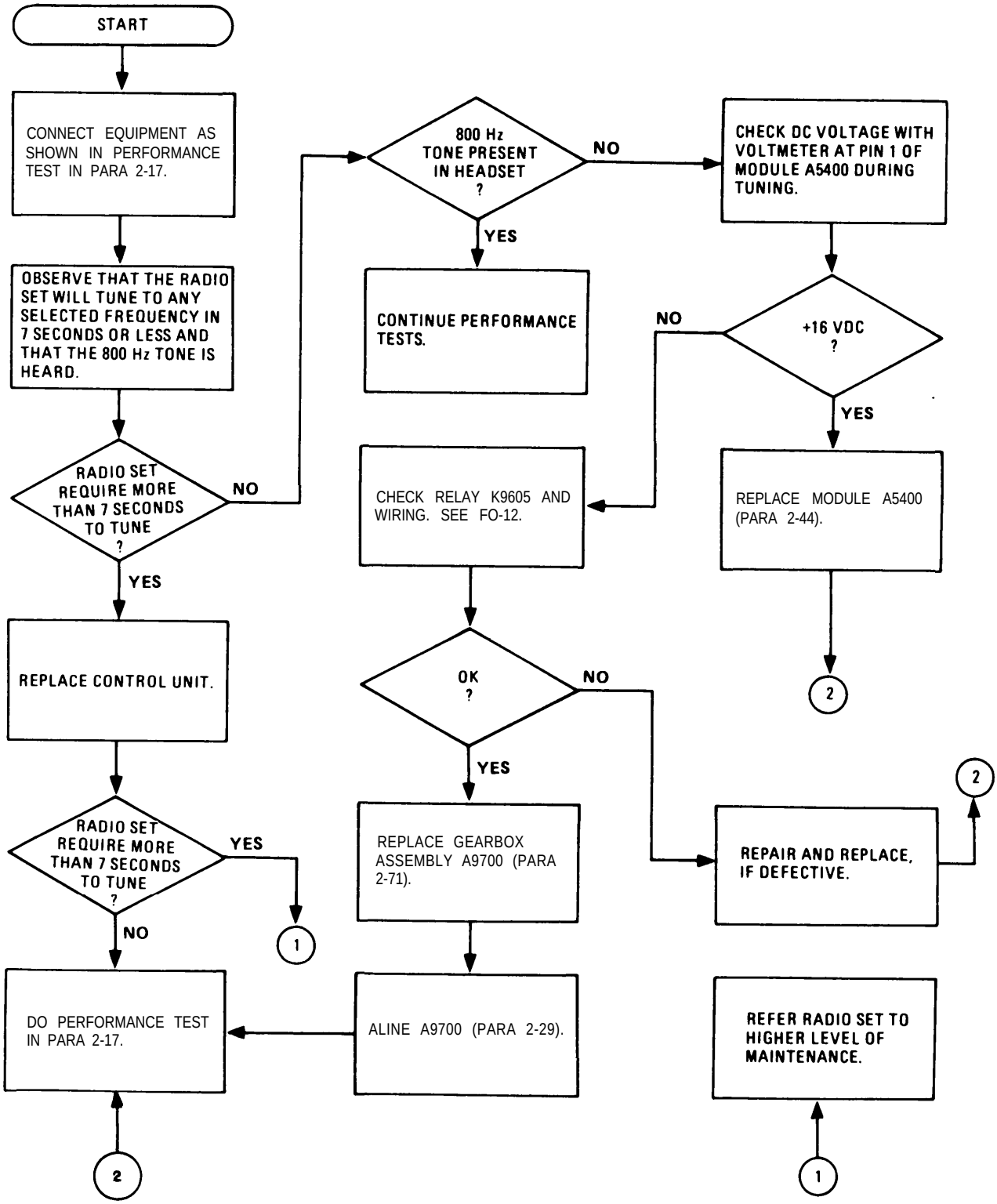
CHART 2-19
Transmitter Frequency Stability Troubleshooting
(Sheet 5 of 5)





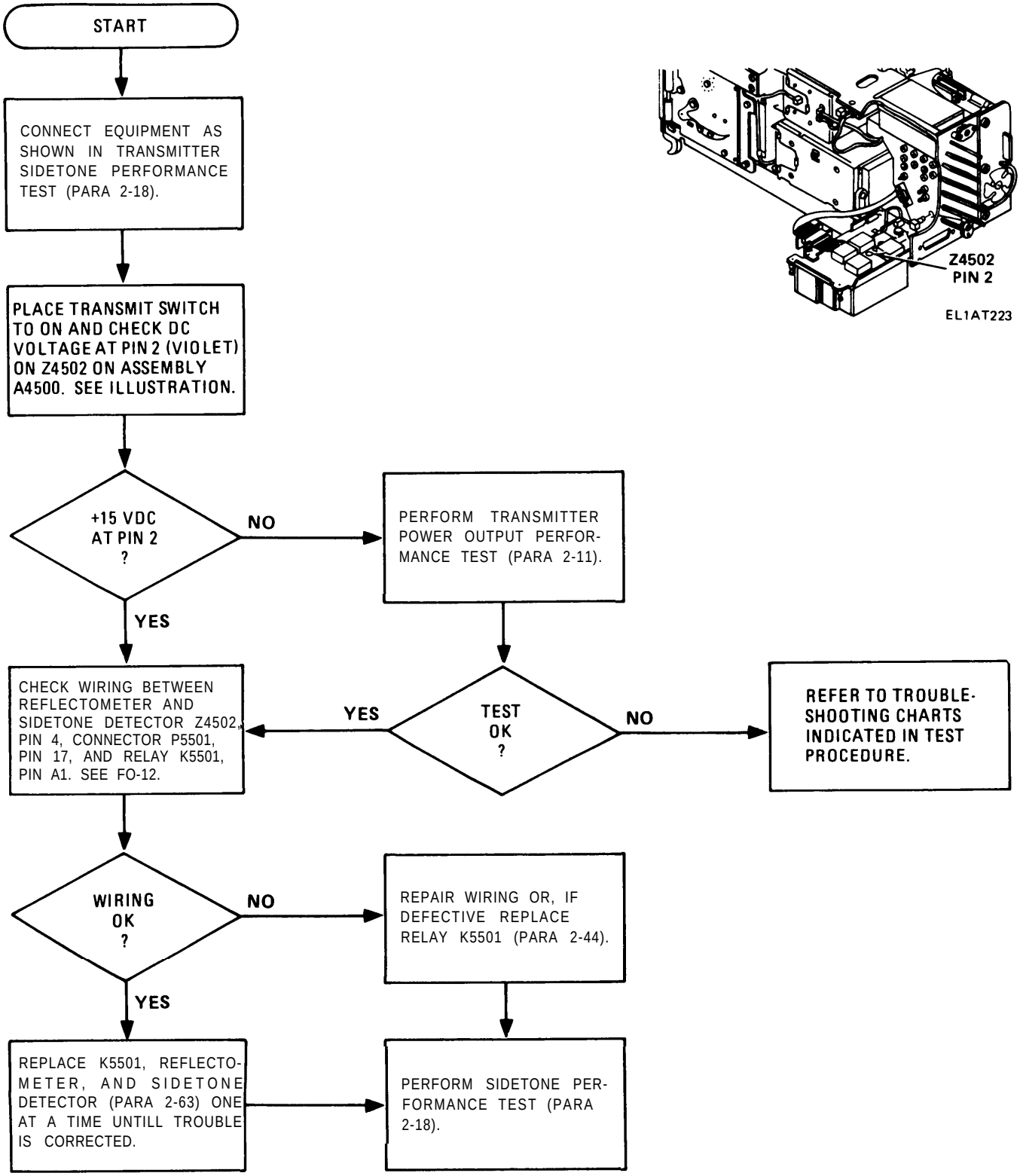
2-26. TROUBLESHOOTING CHARTS. (CONT)

CHART 2-20
Automatic Frequency Selection and Channel Changing Tone Troubleshooting


START
CONNECT EQUIPMENT AS SHOWN IN PERFORMANCE TEST IN PARA 2-17.
OBSERVE THAT THE RADIO SET WILL TUNE TO ANY SELECTED FREQUENCY IN 7 SECONDS OR LESS AND THAT THE 800 Hz TONE IS HEARD.
RADIO SET REQUIRE MORE THAN 7 SECONDS TO TUNE ?
NO
YES
REPLACE CONTROL UNIT.
RADIO SET REQUIRE MORE THAN 7 SECONDS TO TUNE ?
YES
NO
1
DO PERFORMANCE TEST IN PARA 2-17.
2
800 Hz TONE PRESENT IN HEADSET ?
NO
YES
CONTINUE PERFORMANCE TESTS.
CHECK RELAY K9605 AND WIRING. SEE FO-12.
OK ?
NO
YES
REPLACE GEARBOX ASSEMBLY A9700 (PARA 2-71).
ALINE A9700 (PARA 2-29).
CHECK DC VOLTAGE WITH VOLTMETER AT PIN 1 OF MODULE A5400 DURING TUNING.
+16 VDC ?
NO
YES
REPLACE MODULE A5400 (PARA 2-44).
2
REPAIR AND REPLACE, IF DEFECTIVE.
2
REFER RADIO SET TO HIGHER LEVEL OF MAINTENANCE.
1

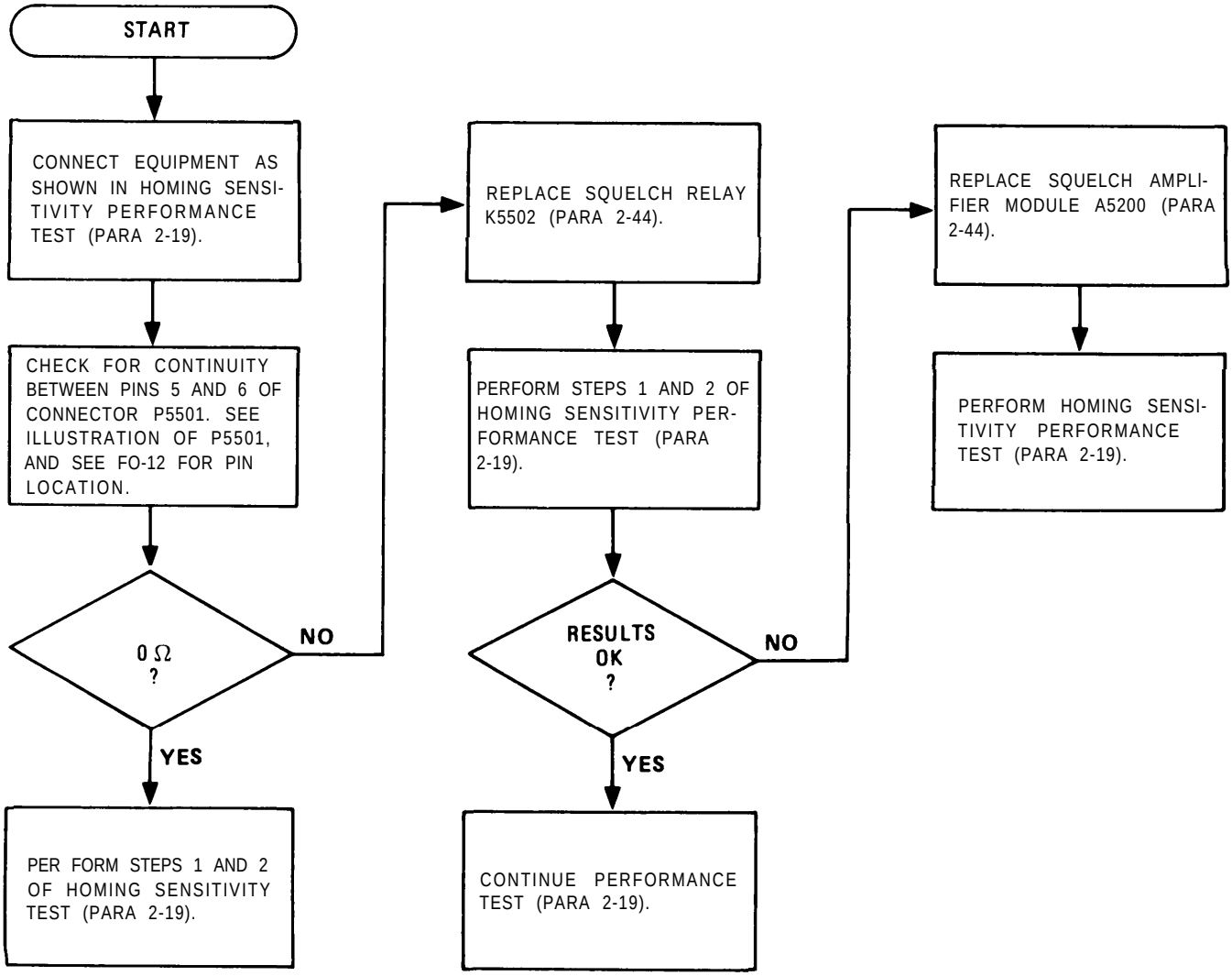
2-26. TROUBLESHOOTING CHARTS. (CONT)

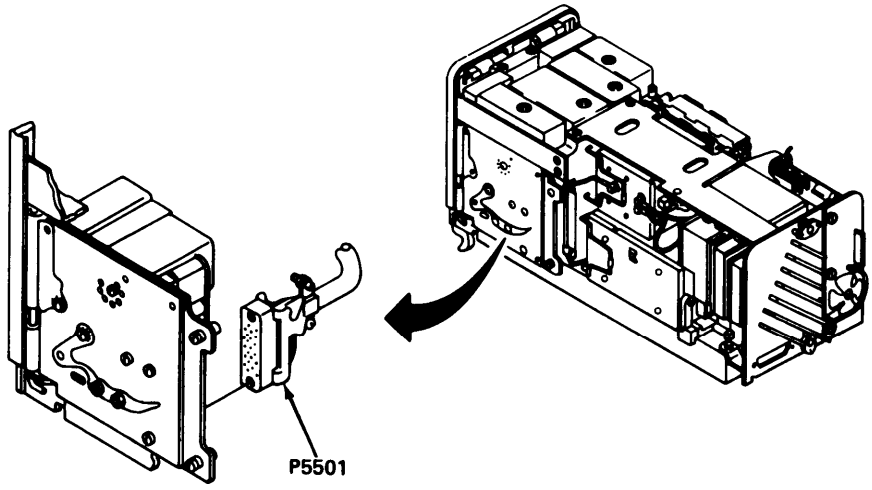
CHART 2-21
Transmitter Sidetone Troubleshooting


START
CONNECT EQUIPMENT AS SHOWN IN TRANSMITTER SIDETONE PERFORMANCE TEST (PARA 2-18).
PLACE TRANSMIT SWITCH TO ON AND CHECK DC VOLTAGE AT PIN 2 (VIOLET) ON Z4502 ON ASSEMBLY A4500. SEE ILLUSTRATION.
+15 VDC AT PIN 2 ?
NO
PERFORM TRANSMITTER POWER OUTPUT PERFORMANCE TEST (PARA 2-11).
YES
CHECK WIRING BETWEEN REFLECTOMETER AND SIDETONE DETECTOR Z4502, PIN 4, CONNECTOR P5501, PIN 17, AND RELAY K5501, PIN A1. SEE FO-12.
YES
TEST OK ?
NO
REFER TO TROUBLESHOOTING CHARTS INDICATED IN TEST PROCEDURE.
WIRING OK ?
NO
REPAIR WIRING OR, IF DEFECTIVE REPLACE RELAY K5501 (PARA 2-44).
YES
REPLACE K5501, REFLECTOMETER, AND SIDETONE DETECTOR (PARA 2-63) ONE AT A TIME UNTILL TROUBLE IS CORRECTED.
PERFORM SIDETONE PERFORMANCE TEST (PARA 2-18).

2-26. TROUBLESHOOTING CHARTS. (CONT)

CHART 2-22
Homing Flag Indication Troubleshooting

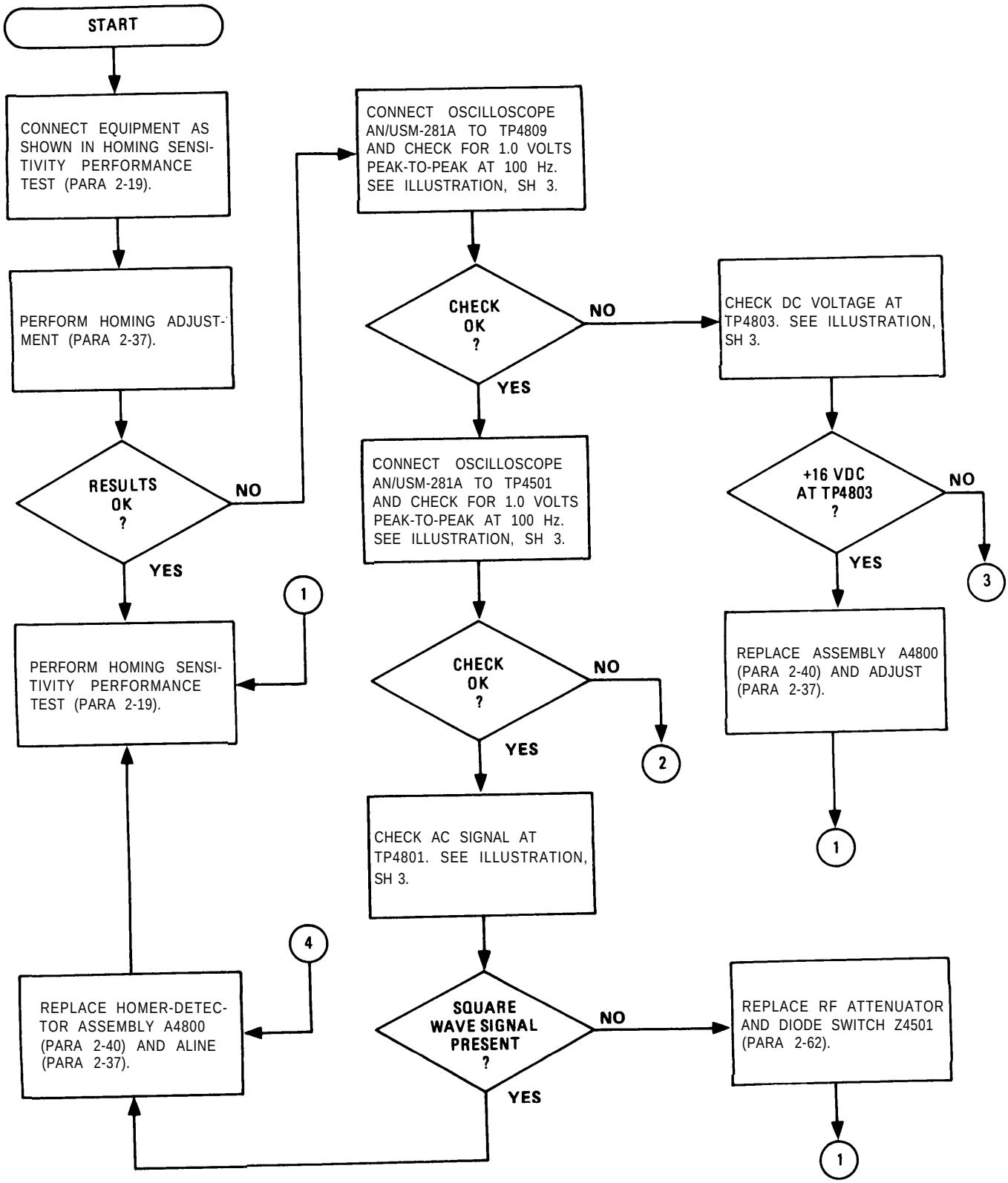

START
CONNECT EQUIPMENT AS SHOWN IN HOMING SENSITIVITY PERFORMANCE TEST (PARA 2-19).
CHECK FOR CONTINUITY BETWEEN PINS 5 AND 6 OF CONNECTOR P5501. SEE ILLUSTRATION OF P5501, AND SEE FO-12 FOR PIN LOCATION.
0 Ω ?
NO
YES
PER FORM STEPS 1 AND 2 OF HOMING SENSITIVITY TEST (PARA 2-19).
REPLACE SQUELCH RELAY K5502 (PARA 2-44).
PERFORM STEPS 1 AND 2 OF HOMING SENSITIVITY PERFORMANCE TEST (PARA 2-19).
RESULTS OK ?
NO
YES
CONTINUE PERFORMANCE TEST (PARA 2-19).
REPLACE SQUELCH AMPLIFIER MODULE A5200 (PARA 2-44).
PERFORM HOMING SENSITIVITY PERFORMANCE TEST (PARA 2-19).



EL1AT224

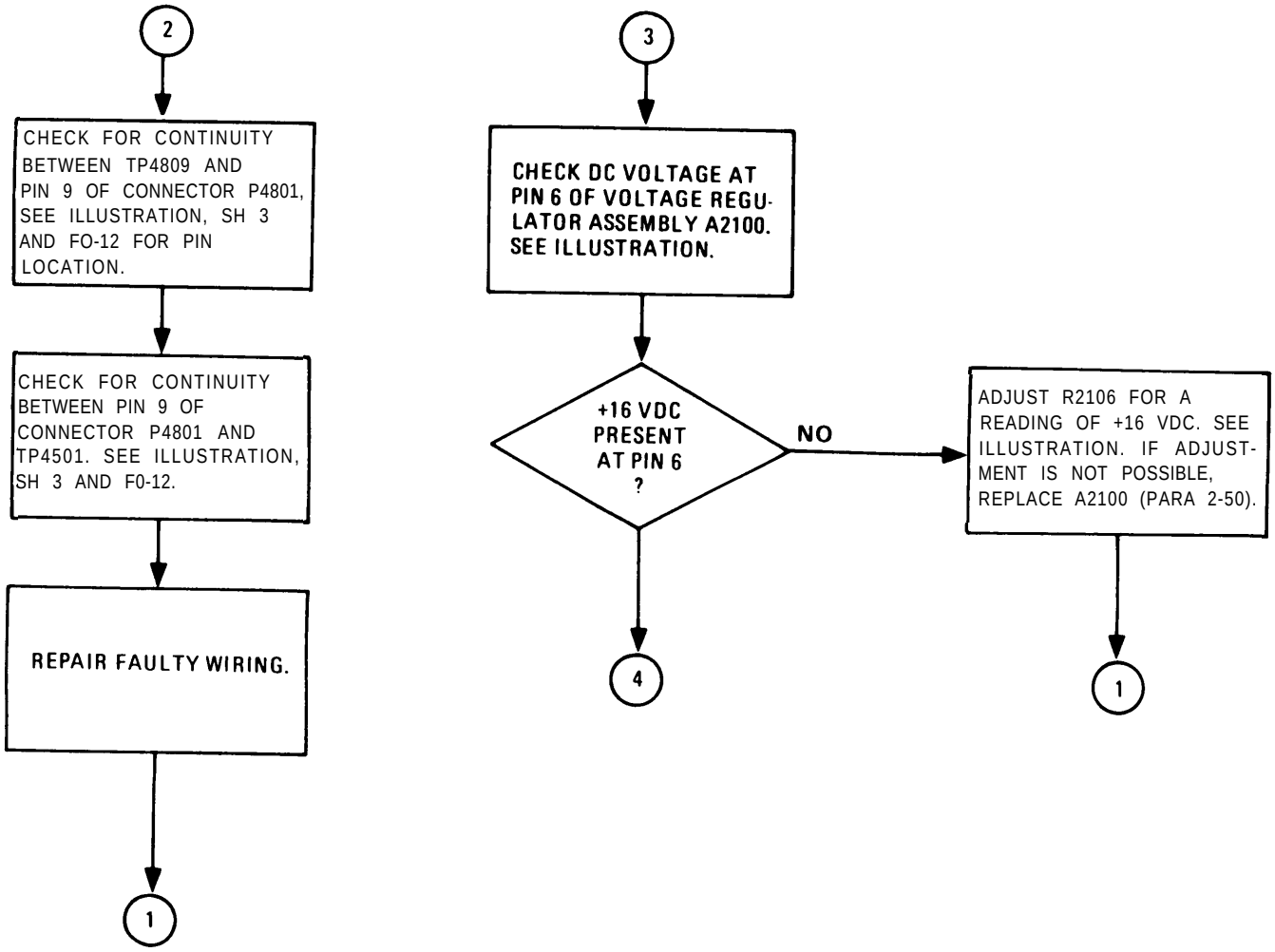
2-26. TROUBLESHOOTING CHARTS. (CONT)

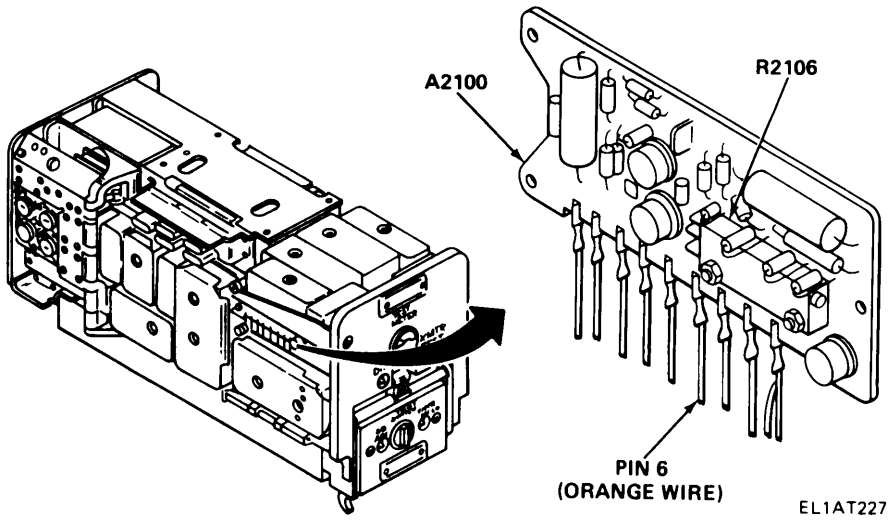
CHART 2-23
Homing Needle Indication Troubleshooting
(Sheet 1 of 3)


START
CONNECT EQUIPMENT AS SHOWN IN HOMING SENSITIVITY PERFORMANCE TEST (PARA 2-19).
PERFORM HOMING ADJUSTMENT (PARA 2-37).
RESULTS OK ?
NO
YES
PERFORM HOMING SENSITIVITY PERFORMANCE TEST (PARA 2-19).
1
CONNECT OSCILLOSCOPE AN/USM-281A TO TP4809 AND CHECK FOR 1.0 VOLTS PEAK-TO-PEAK AT 100 Hz. SEE ILLUSTRATION, SH 3.
CHECK OK ?
NO
YES
CONNECT OSCILLOSCOPE AN/USM-281A TO TP4501 AND CHECK FOR 1.0 VOLTS PEAK-TO-PEAK AT 100 Hz. SEE ILLUSTRATION, SH 3.
CHECK OK ?
NO
YES
2
CHECK AC SIGNAL AT TP4801. SEE ILLUSTRATION, SH 3.
SQUARE WAVE SIGNAL PRESENT ?
NO
YES
4
REPLACE HOMER-DETECTOR ASSEMBLY A4800 (PARA 2-40) AND ALINE (PARA 2-37).
CHECK DC VOLTAGE AT TP4803. SEE ILLUSTRATION, SH 3.
+16 VDC AT TP4803 ?
NO
YES
3
REPLACE ASSEMBLY A4800 (PARA 2-40) AND ADJUST (PARA 2-37).
1
REPLACE RF ATTENUATOR AND DIODE SWITCH Z4501 (PARA 2-62).
1

2-26. TROUBLESHOOTING CHARTS. (CONT)

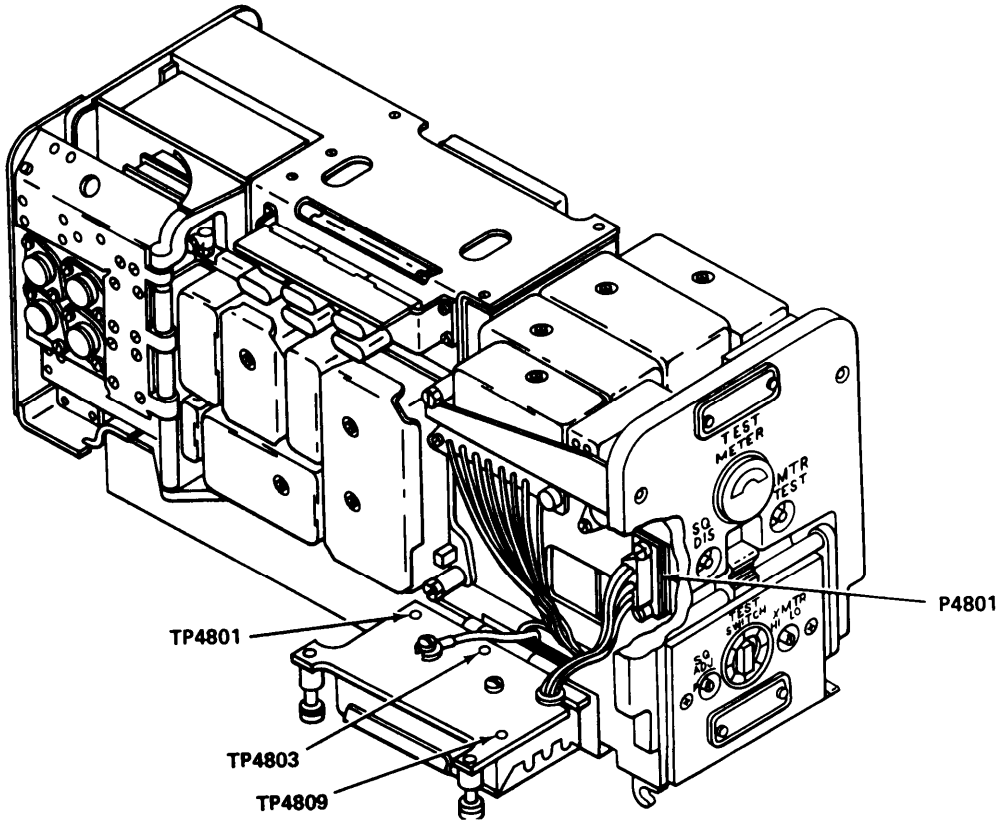
CHART 2-23
Homing Needle Indication Troubleshooting
(Sheet 2 of 3)


2
CHECK FOR CONTINUITY BETWEEN TP4809 AND PIN 9 OF CONNECTOR P4801, SEE ILLUSTRATION, SH 3 AND FO-12 FOR PIN LOCATION.
CHECK FOR CONTINUITY BETWEEN PIN 9 OF CONNECTOR P4801 AND TP4501. SEE ILLUSTRATION, SH 3 AND F0-12.
REPAIR FAULTY WIRING.
1
3
CHECK DC VOLTAGE AT PIN 6 OF VOLTAGE REGULATOR ASSEMBLY A2100. SEE ILLUSTRATION.
+16 VDC PRESENT AT PIN 6 ?
NO
ADJUST R2106 FOR A READING OF +16 VDC. SEE ILLUSTRATION. IF ADJUSTMENT IS NOT POSSIBLE, REPLACE A2100 (PARA 2-50).
4
1

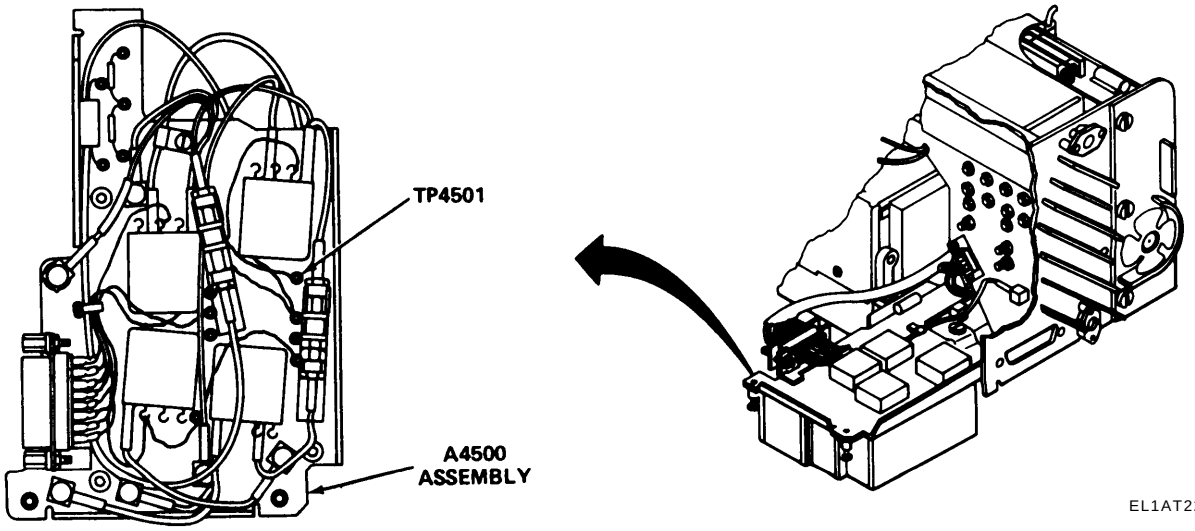


2-26. TROUBLESHOOTING CHARTS. (CONT)

CHART 2-23
Homing Needle Indication Troubleshooting
(Sheet 3 of 3)



EL1AT225



EL1AT226

2-26. TROUBLESHOOTING CHARTS. (CONT)

CHART 2-24
Control Unit Troubleshooting
(Sheet 1 of 12)

NOTE

Use the troubleshooting table to isolate and correct faults in the control unit. The troubleshooting table is used in the following manner.

1. Go to malfunction item number referred to in performance test.
2. Perform test or inspection.
3. If corrective action is taken, repeat performance test.
4. If no corrective action is taken, go to next step.
5. Repeat test procedure. Do all steps in sequence.

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
1. Control panel lamps do not light.	No test.	Replace panel light assembly (para 2-76).
2. Wrong indication on test meter (+ 27.5 vdc applied),	Check continuity between main connector J9101 pins E, D, and C and J9101 pins e, f, and F. (See FO-13.)	Repair wiring or replace MODE SWITCH S9105 (para 2-81).
3. Blower motor does not run.	Check continuity between main connector J9101 pins q and v. (See FO-13.)	Repair wiring or replace MODE SWITCH S9105 (para 2-81).
4. Absence of 27.5 vdc at TP4504.	Check continuity between pins C, D, E, and DD of main connector J9101. (See FO-13.)	Repair wiring or replace MODE SWITCH S9105 (para 2-81).

2-26. TROUBLESHOOTING CHARTS. (CONT)

CHART 2-24
Control Unit Troubleshooting
(Sheet 2 of 12)

MALFUNCTION TEST OR INSPECTION	CORRECTIVE ACTION
5. Speaker noise present/not present (SQUELCH switch at CARR).	
Check for short circuit between main connector J9101 pin V and ground. (See FO-13.)	
	Replace switch S9106 (para 2-78).
6. Speaker noise not present (SQUELCH switch at DIS).	
Check for infinite resistance between main connector J9101 pin V and ground. (See FO-13.)	
	Repair wiring or replace S9105 (para 2-81) or squelch switch S9106 (para 2-78).
7. Gearbox kHz indicator does not track with frequency selected.	
Check continuity of the kHz tuning control lines to ground. (See table Ⓐ on sh 9, FO-13 and FO-21.) Also see resistance tables sh 4.	
	Repair wiring or replace frequency selector switches S9103 (para 2-80) or S9104 (para 2-80).
8. Gearbox MHz indicator does not track with frequency selected.	
Check continuity of the MHz tuning control lines to ground. (See table Ⓒ on sh 11, FO-13 and FO-21.) Also see resistance tables sh 4.	
	Repair wiring or replace frequency selector switches S9101 (para 2-83) or S9104 (para 2-80).
9. Antenna coupler simulator test failure.	
Check continuity of the MHz tuning control lines to ground. (See table Ⓑ on sh 10, FO-13 and FO-21.) Also see resistance tables sh 4.	
	Repair wiring or replace frequency selector switches S9101 (para 2-83) or S9102 (para 2-84).

2-26. TROUBLESHOOTING CHARTS. (CONT)

CHART 2-24
Control Unit Troubleshooting
(Sheet 3 of 12)

MALFUNCTION TEST OR INSPECTION	Corrective ACTION
10. Gearbox BAND SWITCH does not activate at 53 MHz.	
Check continuity between main connector J9101 pin J and ground. (See FO-13.)	
	Repair wiring or replace frequency selector switches S9101 (para 2-83) or S9102 (para 2-64).

2-26. TROUBLESHOOTING CHARTS. (CONT)

CHART 2-24
Control Unit Troubleshooting
(Sheet 4 of 12)

CONTROL UNIT RESISTANCE TABLES

The charts in this section list resistance readings that should be observed at each pin of J9101 for each control position. All measurements are made with the ME-26D/U. Resistances are in ohms. VOL control R9103 is set fully clockwise; all other switches are set as indicated.

MODE SWITCH at OFF, SQUELCH switch at DIS, and frequency selectors at 30.00.

FROM PIN	TO PIN	RESISTANCE
m,BB,LL,J,j,L,z,g,R,S,T,X, FF,HH,MM,NN,t,s,q,v,u,JJ, PP,y,x,w,d,c,B,A,a,Y,E,D,C	All other pins	Inf
GG	DD	27 k
KK	N	163 (VOL fully clockwise)
e	f	0
f	F	0
b	Ground	0
b	Z	0
V,k,cc,G,M,AA,H,P,U	Ground	0

MODE SWITCH at OFF and SQUELCH switch at CARR or TONE.

FROM PIN	TO PIN	RESISTANCE
V	Ground	Inf
Z,b	Ground	0
Y,C,D,E,a,A,B,C,d,w,x,y, PP,JJ,u,v,q,s,t,NN,MM, HH,FF,X	All other pins	Inf
GG	DD	27 k
KK	N	163 (VOL fully clockwise)
e	f	0
f	F	0

2-26. TROUBLESHOOTING CHARTS. (CONT)

CHART 2-24
Control Unit Troubleshooting
(Sheet 5 of 12)

MODE SWITCH at T/R, SEQUELCH switch at DIS.

FROM PIN	TO PIN	RESISTANCE
X,FF,HH,MM,NN,t,s,u, PP,w,C,a,A,Y	All other pins	Inf
GG	DD	27 k
q	v	0
JJ	N	0 (VOL fully clockwise)
y	x	0
d	KK,B	0
e,f,F	E,D,C	0
b,Z,V	Ground	0

MODE SWITCH at T/R, SQUELCH switch at CARR.

FROM PIN	TO PIN	RESISTANCE
V	Ground	Inf
Y,X,FF,HH,MM,NN,t,s, u,PP,w,c,A,b,Z	All other plns	Inf
b,Z	Ground	0
GG	DD	27 k
q	v	0
JJ	N	0 (VOL fully clockwise)
y	x	0
d	KK,B	0
e,f,F	E,D,C	0

MODE SWITCH at T/R, SQUELCH switch at TONE.

FROM PIN	TO PIN	RESISTANCE
X	Ground	0
GG	DD	27 k
FF,HH,MM,NN,t,s,PP, w,c,A,a,Y,V	All other pins	Inf
q	v	0
JJ	N	0 (VOL fully clockwise)
y	x	0
d	KK,B	0
e,f,F	E,D,C	0
b,Z	Ground	0

2-26. TROUBLESHOOTING CHARTS. (CONT)

CHART 2-24
Control Unit Troubleshooting
(Sheet 6 of 12)

MODE SWITCH at RETRAN, SQUELCH switch at DIS.

FROM PIN	TO PIN	RESISTANCE
X,FF,HH,MM,NN,t,s,a,Y	All other pins	Inf
GG	DD	27 k
q	v	0
v	u	0
JJ	N	0 (VOL fully clockwise)
PP	KK	0
KK	B	0
w	KK	0
KK	d	0
y	x	0
x	c	510
JJ	A	0
e,f,F	E,D,C	0
b,Z,v	Ground	0

MODE SWITCH at RETRAN, SQUELCH switch at CARR.

FROM PIN	TO PIN	RESISTANCE
X,FF,MM,NN,t,s,V	All other pins	Inf
KK	N	163 (VOL fully clockwise)
GG	DD	27 k
HH	Y	0
q	v	0
v	u	0
JJ	N	0 (VOL fully clockwise)
PP	KK	0
y	x	0
x	c	510
w	KK	0
KK	d	0
PP	B	0
JJ	A	0
e,f,F	E,D,C	0
b,z	Ground	0

2-26. TROUBLESHOOTING CHARTS. (CONT)

CHART 2-24
Control Unit Troubleshooting
(Sheet 7 of 12)

MODE SWITCH at RETRAN, SQUELCH switch at TONE.

FROM PIN	TO PIN	RESISTANCE
x	Ground	0
GG	DD	27 k
FF,MM,NN,t,s,a,V	All other pins	Inf
HH	Y	0
q	v	0
v	u	0
JJ	N	0 (VOL fully clockwise)
PP	KK,B	0
y	x	0
w	KK,d	0
e,f,F	E,D,C	0
x	c	510
b,Z	Ground	0

MODE SWITCH at HOME, SQUELCH switch at DIS.

FROM PIN	TO PIN	RESISTANCE
X,FF,HH,u,PP,w,c,Y	All other pins	Inf
GG	DD	27 k
DD	e,f,F	Inf
e,f,F	DD,E,D,C	0
MM	NN	0
t	s	0
q	[illegible]	0
JJ	N	0 (VOL fully clockwise)
JJ	A	0
JJ	KK	163 (VOL fully clockwise)
y	x	0
d	KK,B	0
b,Z,v	Ground	0

2-26. TROUBLESHOOTING CHARTS. (CONT)

CHART 2-24
Control Unit Troubleshooting
(Sheet 8 of 12)

MODE SWITCH at HOME, SQUELCH switch at CARR.

FROM PIN	TO PIN	RESISTANCE
X,HH,PP,U,A,w,a,V,c	All other pins	Inf
GG	DD	27 k
DD	e,f,F	Inf
e,f,F	DD,E,D,C	0
FF	Y	0
MM	NN	0
t	s	0
q	v	0
JJ	N	0 (VOL fully clockwise)
y	x	0
d	KK,B	0
b,Z	Ground	0

MODE SWITCH at HOME, SQUELCH switch at TONE.

FROM PIN	TO PIN	RESISTANCE
HH,U,PP,w,c,A,V,a	All other pins	Inf
GG	DD	27 k
FF	Y	0
MM	NN	0
t	s	0
q	v	0
JJ	N	0 (VOL fully clockwise)
JJ	KK	163 (VOL fully clockwise)
y	x	0
d	KK,B	0
DD	e,f,F	Inf
e,f,F	DD,E,C	0
b,Z,x	Ground	0

2-26. TROUBLESHOOTING CHARTS. (CONT)

CHART 2-24
Control Unit Troubleshooting
(Sheet 9 of 12)

FREQUENCY SELECTION CODE TABLES

The tables in this section indicate the pins of J9101 that are grounded and the pins that are not grounded for each setting of the frequency selector switches. The grounded pins are indicated by zero resistance in the tables, and the ungrounded pins by INF (infinite) resistance. Pin G is grounded for all frequency settings from 30.00 to 52.00 MHz, pin J is grounded for all settings from 53.00 to 75.00 MHz, pin H is grounded for all settings from 30.00 to 49.00 MHz, and pin g is grounded for all settings from 50.00 to 75.00 MHz.

TABLE (A)

Resistance Measurements for KC Tuning Control Lines

LAST TWO DIGITS OF FREQUENCY SELECTED	RESISTANCE TO GROUND FOR CONNECTOR J9101 PIN N NUMBER				
	P	R	S	T	U
00	0	INF	INF	INF	0
05	INF	0	INF	INF	INF
10	INF	INF	0	INF	INF
15	INF	INF	INF	0	INF
20	INF	INF	INF	INF	0
25	0	INF	INF	INF	INF
30	0	0	INF	INF	INF
35	INF	0	0	INF	INF
40	INF	INF	0	0	INF
45	0	INF	INF	0	0
50	0	0	INF	INF	0
55	0	0	0	INF	INF
60	INF	0	0	0	INF
65	0	INF	0	0	0
70	0	0	INF	0	0
75	0	0	0	INF	0
80	0	0	0	0	INF
85	INF	0	0	0	0
90	INF	INF	0	0	0
95	INF	INF	INF	0	0

2-26. TROUBLESHOOTING CHARTS. (CONT)

CHART 2-24
Control Unit Troubleshooting
(Sheet 10 of 12)

TABLE (B)

Resistance Measurements for Antenna Coupler MC Tuning Control Lines

FREQUENCY SELECTED (MHz)	RESISTANCE TO GROUND FOR CONNECTOR J9101 PIN NUMBER						
	M	L	j	z	AA	H	g
30	0	INF	INF	INF	0	0	INF
31	INF	0	INF	INF	INF	0	INF
32	INF	INF	0	INF	INF	0	INF
33	INF	INF	INF	0	INF	0	INF
34	INF	INF	INF	INF	0	0	INF
35	0	INF	INF	INF	INF	0	INF
36	0	0	INF	INF	INF	0	INF
37	INF	0	0	INF	INF	0	INF
38	INF	INF	0	0	INF	0	INF
39	0	INF	INF	0	0	0	INF
40	0	0	INF	INF	0	0	INF
41	0	0	0	INF	INF	0	INF
42	INF	0	0	0	INF	0	INF
43	0	INF	0	0	0	0	INF
44	0	0	INF	0	0	0	INF
45	0	0	0	INF	0	0	INF
46	0	0	0	0	INF	0	INF
47	INF	0	0	0	0	0	INF
48	INF	INF	0	0	0	0	INF
49	INF	INF	INF	0	0	0	INF
50	0	INF	INF	INF	0	INF	0
51	INF	0	INF	INF	INF	INF	0
52	INF	INF	0	INF	INF	INF	0
53	INF	INF	INF	0	INF	INF	0
54	INF	INF	INF	INF	0	INF	0
55	0	INF	INF	INF	INF	INF	0
56	0	0	INF	INF	INF	INF	0
57	INF	0	0	INF	INF	INF	0
58	INF	INF	0	0	INF	INF	0
59	0	INF	INF	0	0	INF	0
60	0	0	INF	INF	0	INF	0

2-26. TROUBLESHOOTING CHARTS. (CONT)

CHART 2-24
Control Unit Troubleshooting
(Sheet 11 of 12)

TABLE Ⓑ (CONT)

	RESISTANCE TO GROUND FOR CONNECTOR J9101 PIN NUMBER						
FREQUENCY SELECTED (MHz)	M	L	j	z	AA	H	g
61	0	0	0	INF	INF	INF	0
62	INF	0	0	0	INF	INF	0
63	0	INF	0	0	0	INF	0
64	0	0	INF	0	0	INF	0
65	0	0	0	INF	0	INF	0
66	0	0	0	0	INF	INF	0
67	INF	0	0	0	0	INF	0
66	INF	INF	0	0	0	INF	0
69	INF	INF	INF	0	0	INF	0
70	INF	INF	INF	0	0	INF	0
71	INF	INF	INF	0	0	INF	0
72	INF	INF	INF	0	0	INF	0
73	INF	INF	INF	0	0	INF	0
74	INF	INF	INF	0	0	INF	0
75	INF	INF	INF	0	0	INF	0

TABLE Ⓒ

Resistance Measurements for MC Tuning Control Lines

	RESISTANCE TO GROUND FOR CONNECTOR J9101 PIN NUMBER						
FREQUENCY SELECTED (MHz)	k	m	BB	LL	CC	G	J
30	0	INF	INF	INF	0	0	INF
31	INF	0	INF	INF	INF	0	INF
32	INF	INF	0	INF	0	0	INF
33	0	INF	INF	0	0	0	INF
34	0	0	INF	INF	0	0	INF
35	INF	0	0	INF	0	0	INF
36	0	INF	0	0	0	0	INF
37	0	0	INF	0	0	0	INF
36	0	0	0	INF	0	0	INF
39	INF	0	0	0	0	0	INF

2-26. TROUBLESHOOTING CHARTS. (CONT)

CHART 2-24
Control Unit Troubleshooting
(Sheet 12 of 12)

FREQUENCY SELECTED (MHz)	RESISTANCE TO GROUND FOR CONNECTOR J9101 PIN NUMBER						
	k	m	BB	LL	CC	G	J
40	INF	INF	0	0	0	0	INF
41	INF	INF	INF	0	0	0	INF
42	0	INF	INF	INF	INF	0	INF
43	INF	0	INF	INF	INF	0	INF
44	INF	INF	0	INF	INF	0	INF
45	0	INF	INF	0	INF	0	INF
46	0	0	INF	INF	INF	0	INF
47	INF	0	0	INF	INF	0	INF
48	0	INF	0	0	INF	0	INF
49	0	0	INF	0	INF	0	INF
50	0	0	0	INF	INF	0	INF
51	INF	0	0	0	INF	0	INF
52	INF	INF	0	0	INF	0	INF
53	0	INF	INF	INF	0	INF	0
54	INF	0	INF	INF	0	INF	0
55	INF	INF	0	INF	0	INF	0
56	0	INF	INF	0	0	INF	0
57	0	0	INF	INF	0	INF	0
58	INF	0	0	INF	0	INF	0
59	0	INF	0	0	0	INF	0
60	0	0	INF	0	0	INF	0
61	0	0	0	INF	0	INF	0
62	INF	0	0	0	0	INF	0
63	INF	INF	0	0	0	INF	0
64	INF	INF	INF	0	0	INF	0
65	0	INF	INF	INF	INF	INF	0
66	INF	0	INF	INF	INF	INF	0
67	INF	INF	0	INF	INF	INF	0
68	0	INF	INF	0	INF	INF	0
69	0	0	INF	INF	INF	INF	0
70	INF	0	0	INF	INF	INF	0
71	0	INF	0	0	INF	INF	0
72	0	0	INF	0	INF	INF	0
73	0	0	0	INF	INF	INF	0
74	INF	0	0	0	INF	INF	0
75	INF	INF	0	0	INF	INF	0

Section IV ALINEMENT AND ADJUSTMENT PROCEDURES

Subject	Para	Page
General	2-27	2-126
Rf Amplifier Assembly A6500 Alinement	2-28	2-127
Gearbox Assembly A9700 Alinement	2-29	2-130
Audio Level Adjustment	2-30	2-132
Carrier Squelch Adjustment	2-31	2-134
150 Hz Tone Modulation Frequency and Deviation Adjustment	2-32	2-136
Tone Squelch Adjustment	2-33	2-138
Narrow Band Deviation Adjustment	2-34	2-140
Receiver Sensitivity Adjustments	2-35	2-142
Local Oscillator Alinement	2-36	2-146
Homing Adjustment	2-37	2-148

2-27. GENERAL.

This section contains alinement instructions for use with Maintenance Kit MK-1035/ARC-131 and TMDE (discrete test equipment). The instructions are presented in individual procedures which apply to a specific stage of the rt receiver or transmitter section.

Each procedure is self-contained; that is, all necessary instructions are provided without reference to any previously performed alinement. Therefore, it is possible to use the procedures in this section to aline an individual module without doing any work on other stages in the radio.

However, this maintenance approach is not recommended. It is best to perform a complete realinement of all modules after replacing an individual module. This should be done even if the radio has undergone its annual realinement less than one year prior to the repair.

Careful performance of all the instructions contained in the alinement procedures ensures that the radio will meet all performance standards outlined in section I of this chapter. Although the radio may seem to work satisfactorily if other quick-fix methods are used, there is no guarantee that such methods will result in proper performance when the radio is used along with secure equipment, or for other than voice communication.

2-28. RF AMPLIFIER ASSEMBLY A6500 ALINEMENT.

TEST EQUIPMENT AND MATERIALS

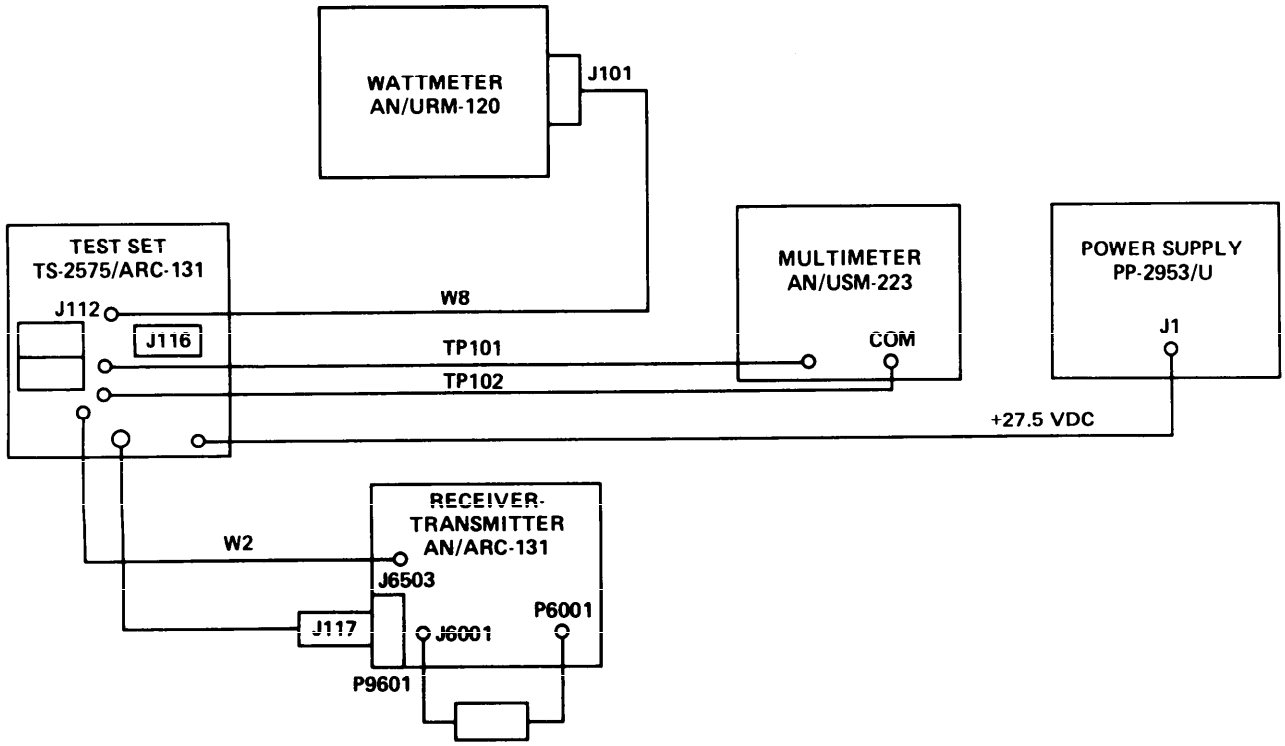
Maintenance Kit MK-1035/ARC-131
Multimeter AN/USM-223
Power Supply PP-2953/U
Receiver-Transmitter AN/ARC-131 (known to be operating properly)
Wattmeter AN/URM-120
All cables are part of MK-1035/ARC

TEST SETUP

Connect equipment as shown in test setup diagram. Turn on all equipment and allow at least 5 minutes for warmup.

NOTE

Install rf amplifier assembly to be alined in a known good receiver-transmitter.



EL1AT228

2-28. RF AMPLIFIER ASSEMBLY A6500 ALINEMENT. (CONT)

INITIAL EQUIPMENT CONTROL SETTINGS

Set equipment controls as indicated in the following table.

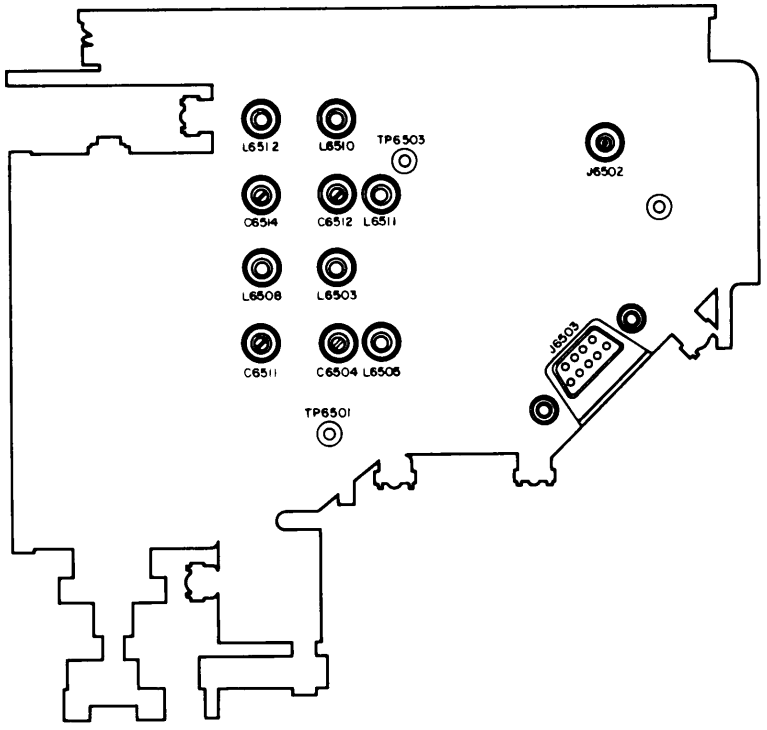
CONTROL AND SWITCH SETTINGS

EQUIPMENT	CONTROL OR SWITCH	POSITION/SETTING
CONTROL UNIT	Mode Selector	T/R
	SQUELCH	DIS
	FREQ sel	65.00 MHz
TS-2575/ARC-131	HI/LO	HI
	AGC switch	OFF

ALINEMENT PROCEDURE

NOTE

During alinement, maintain at least 12 to 15 watts output power. Rf amplifier is activated by switching TRANSMIT switch on test set to ON.



EL1AT229

2-28. RF AMPLIFIER ASSEMBLY A6500 ALINEMENT. (CONT)

1. Place the TRANSMIT switch on test set to ON position.
2. Adjust C6512 for minimum dc current as monitored at TP101 (+) and TP102 (-) on test set.
3. Adjust C6504 for maximum power output.

CAUTION

When adjusting the variable inductors in the following steps, be careful not to overadjust as small tuning cores may drop through bottom of inductor.

4. Set frequency selectors on control unit to 53.00 MHz.
5. Adjust L6510 for minimum dc currents as monitored at TP101 (+) and TP102 (-) on test set.
6. Adjust L6503 for maximum power output.
7. Set frequency selectors on control unit to 75.90 MHz.
8. Adjust L6511 for minimum dc current as monitored on power supply current meter.
9. Adjust L6505 for maximum power output.
10. Check to ensure following output levels can be obtained at specified frequencies.

FREQUENCY	OUTPUT
75.90 MHz	15 watts
65.00 MHz	18 watts
53.00 MHz	18 watts

11. Observe that dc input current does not exceed 2.5 amperes for 15 watts output at 53,65, and 75.90 MHz.
12. Set frequency selectors on control unit to 42.00 MHz.
13. Adjust variable capacitor C6514 for minimum dc current as monitored on power supply current meter.
14. Adjust variable capacitor C6511 for maximum power output.
15. Set frequency selectors on control unit to 30.00 MHz.
16. Adjust variable capacitor C6514 for minimum dc current as monitored on power supply current meter.
17. Set frequency selectors on control unit to 52.90 MHz.
18. Adjust variable capacitor C6514 for minimum dc current as monitored on power supply current meter.
19. Set frequency selectors on control unit to 52.90 MHz.
20. Adjust L6512 for minimum dc current as monitored on power supply current meter.
21. Adjust L6508 for maximum power output.
22. Check to ensure following output levels can be obtained at the specified frequencies.

FREQUENCY	OUTPUT
52.90 MHz	18 watts
42.00 MHz	18 watts
30.00 MHz	16 watts

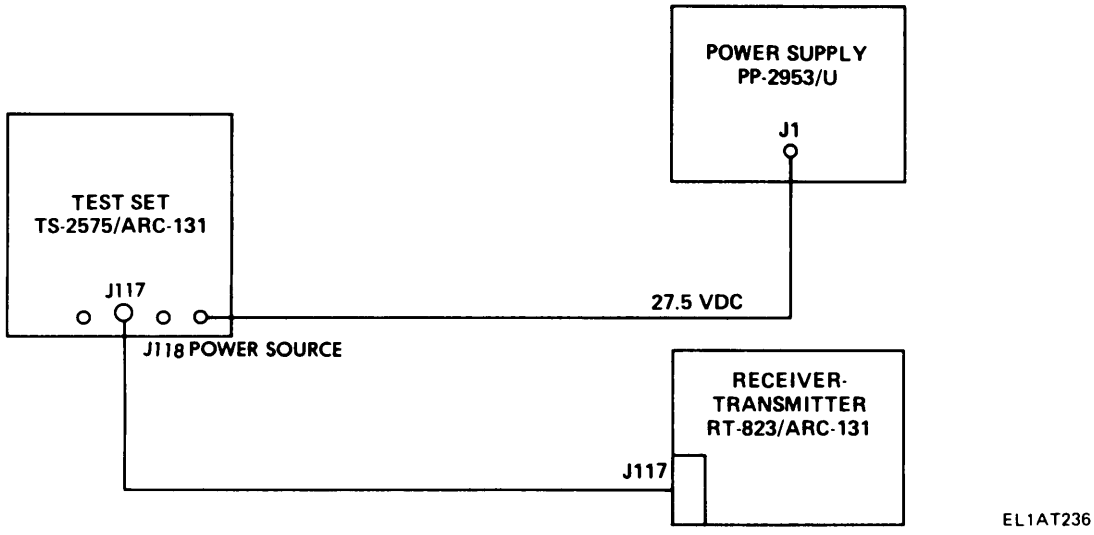
2-29. GEARBOX ASSEMBLY A9700 ALINEMENT.

TEST EQUIPMENT AND MATERIALS

Maintenance Kit MK-1035/ARC-131
Power Supply PP-2953/U

TEST SETUP

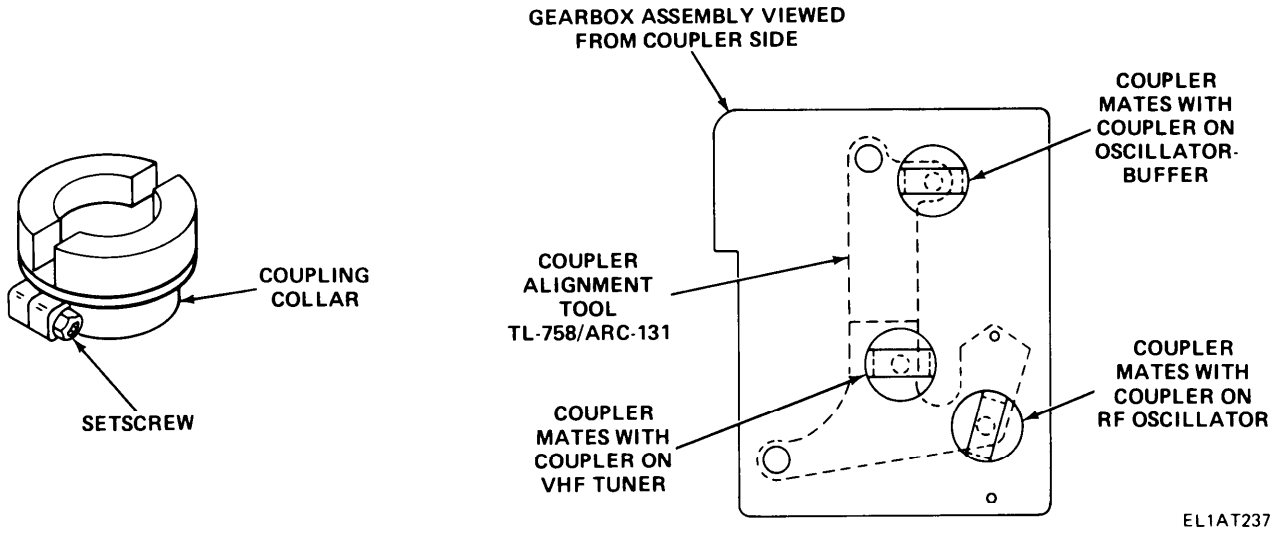
Connect equipment as shown in test setup diagram. Turn on equipment and allow 5 minutes for warmup.



ALINEMENT PROCEDURE

1. Place test set +28 vdc ON-OFF switch to ON, and adjust power supply output for +27.5 vdc.
2. Place test set +28 vdc ON-OFF switch to OFF, and power supply power switch to OFF.
3. Remove vhf tuner A1000 (para 2-68), oscillator buffer A6000 (para 2-89), and rf oscillator assembly A2000 (para 2-70) from gearbox.
4. Place test set +28 vdc ON-OFF switch to ON, and power supply power switch to ON.
5. Set control unit frequency selectors to 53.00 MHz and allow gearbox to cycle.
6. Place test set +28 VDC ON-OFF switch to OFF.

2-29. GEARBOX ASSEMBLY A9700 ALINEMENT. (CONT)


COUPLING COLLAR
SETSCREW
GEARBOX ASSEMBLY VIEWED FROM COUPLER SIDE
COUPLER MATES WITH COUPLER ON OSCILLATOR-BUFFER
COUPLER ALIGNMENT TOOL TL-758/ARC-131
COUPLER MATES WITH COUPLER ON RF OSCILLATOR
COUPLER MATES WITH COUPLER ON VHF TUNER
EL1AT237

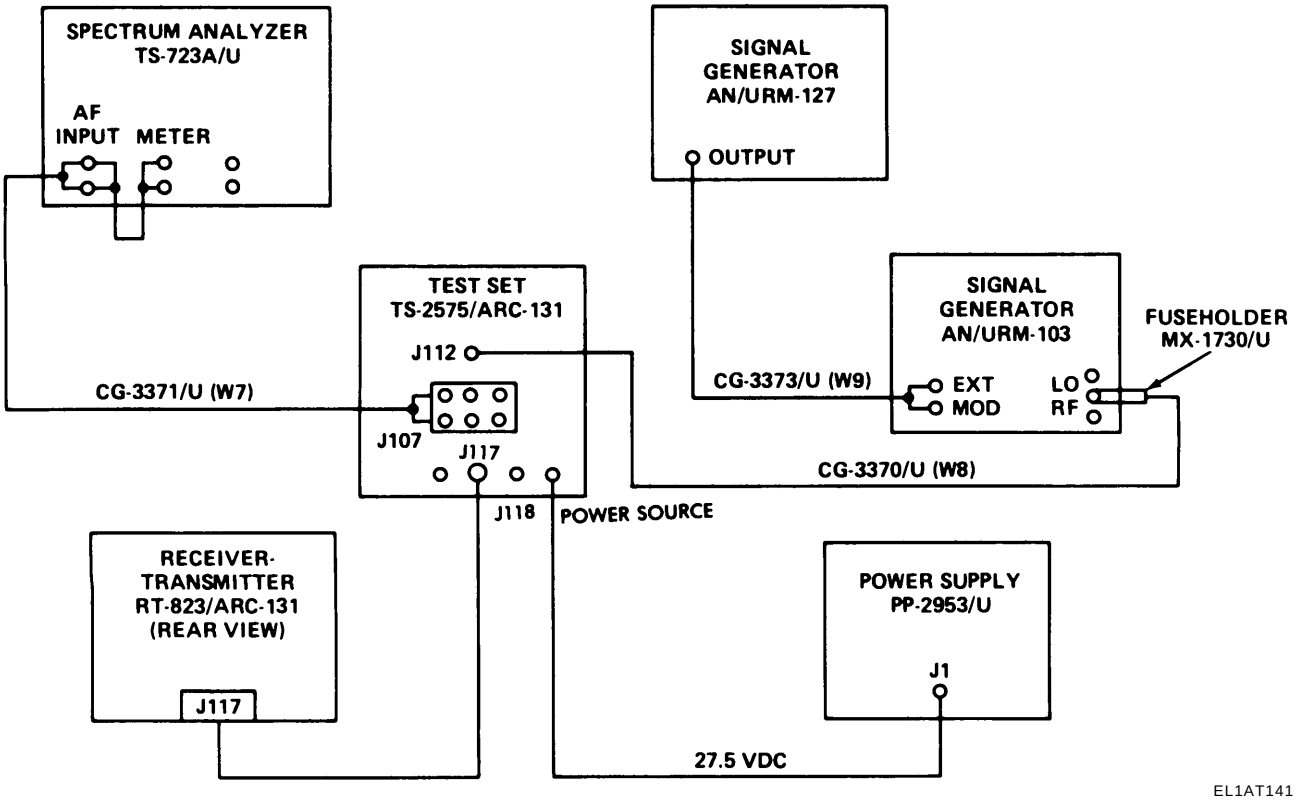
7. Using hex wrench, loosen setscrews on all three coupling collars.
8. Install coupler alinement tool, TL-758/ARC-131 on all couplers.
9. Move couplers to allow coupler alinement tool to drop into coupler slot.
10. Using hex wrench, tighten all setscrews.
11. Remove coupler alinement tool.
12. Install modules removed in step 3.

2-30. AUDIO LEVEL ADJUSTMENT.

TEST EQUIPMENT AND MATERIALS

Maintenance Kit MK-1035/ARC-131
Signal Generator AN/URM-103
Signal Generator AN/URM-127
Spectrum Analyzer TS-723 A/U
Fuseholder MX-1730/U
Power Supply PP-2953/U
All cables are part of MK-1035/ARC
TEST SETUP

Connect equipment as shown in test setup diagram. Turn on all equipment and allow at least 5 minutes for warmup.



INITIAL EQUIPMENT CONTROL SETTINGS

Set equipment controls as indicated in the following table.

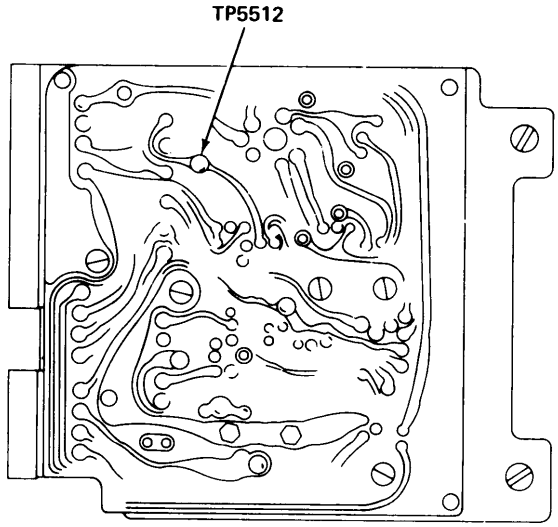
2-30. AUDIO LEVEL ADJUSTMENT. (CONT)

CONTROL AND SWITCH SETTINGS

EQUIPMENT	CONTROL OR SWITCH	POSITION/SETTING
TS-2575/ARC-131	Mode Switch VOL SQUELCH FREQ sel	T/R fully clockwise DIS 60.05
AN/URM-127	amplitude control output frequency	0 1000 Hz
AN/URM-103	Function selector output	EXT MOD 10 microvolt

ADJUSTMENT PROCEDURE

1. Adjust AN/URM-127 for 8 kHz deviation as indicated on AN/URM-103 modulation meter.
2. Set TS-723A/U function switch to METER.
3. Tune AN/URM-103 frequency to 60.05 MHz as indicated on TS-723 A/U meter.
4. On the A4000 assembly, using screwdriver, remove screw on module A4300 cover and remove cover.



EL1AT238

5. Monitor voltage at TP5512 on audiofrequency amplifier assembly using multimeter ME-26B/U, while adjusting R4304 on A4300 module to provide a 0.775 volt indication.
6. Install cover on module A4300.
7. On A5500 assembly, adjust potentiometer R5405 on module A5400 for a reading of 2.8 volts on TS-723A/U meter connected at HI-LO jack J107 on TS-2575/ARC-131.

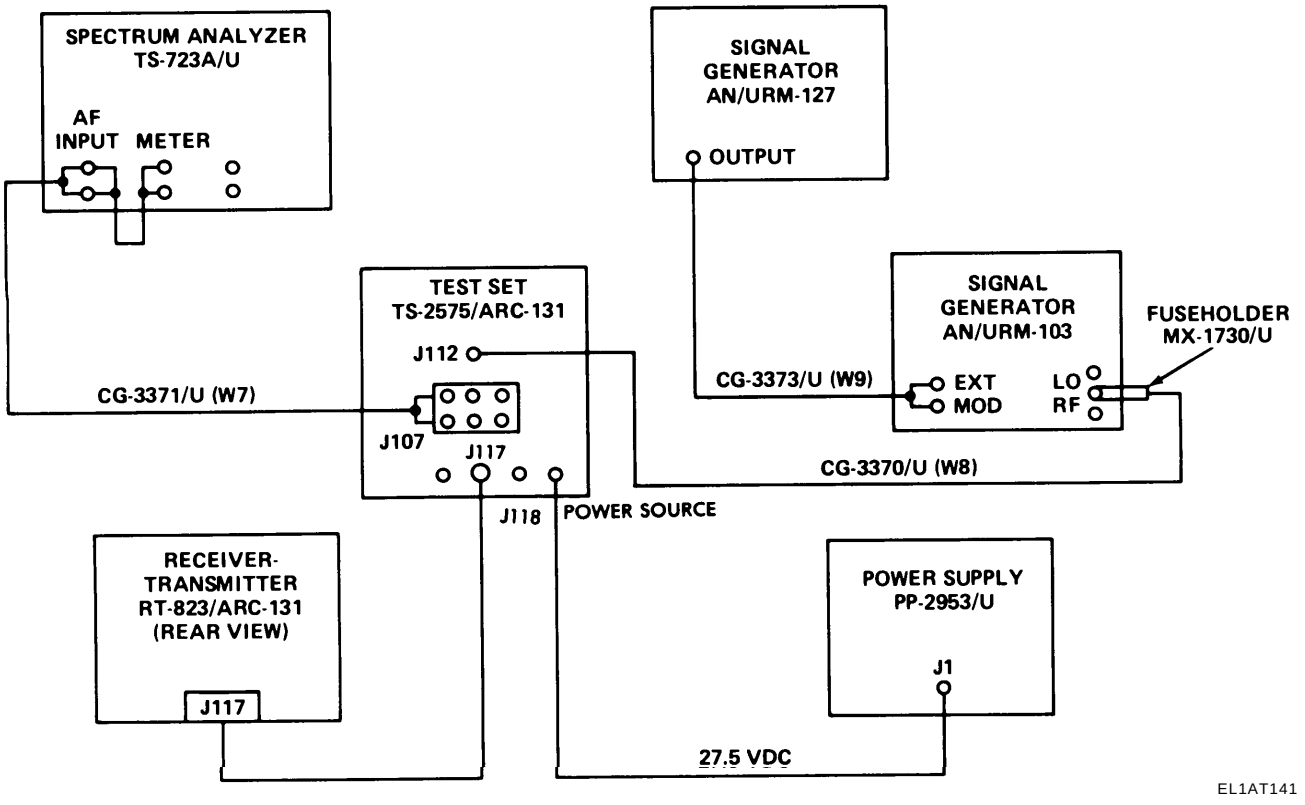
2-31. CARRIER SQUELCH ADJUSTMENT.

TEST EQUIPMENT AND MATERIALS

Maintenance Kit MK-1035/ARC-131
Signal Generator AN/URM-103
Signal Generator AN/URM-127
Fuseholder MX-1730/U
Power Supply PP-2953/U
Spectrum Analyzer TS-723A/U
All cables are part of MK-1035/ARC

TEST SETUP

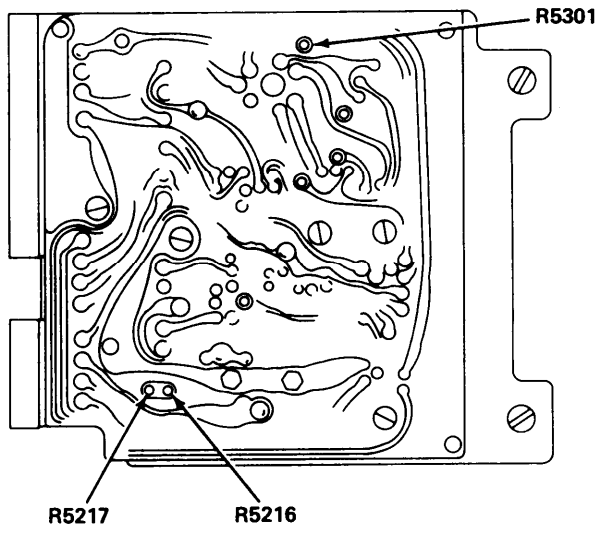
Connect equipment as shown in test setup diagram. Turn on all equipment and allow at least 5 minutes for warmup.



2-31. CARRIER SQUELCH ADJUSTMENT. (CONT)

ADJUSTMENT PROCEDURE

1. On TS-2575/ARC-131, place the +28 VDC ON – OFF switch to ON.



EL1AT239

2. Set carrier squelch potentiometer R5216 on A5500 assembly fully clockwise.
3. Set RT-823/ARC-131 SQ ADJ control fully clockwise.
4. Set control unit mode switch to T/R. VOL control fully clockwise, SQUELCH switch to DIS, and frequency selectors to 60.05 MHz.
5. Set AN/URM-127 amplitude control to 0 and adjust output frequency to 1000 Hz.
6. Set AN/URM-103 FUNCTION selector switch to EXT MOD and adjust output for 10 microvolt.
7. Adjust AN/URM-127 for 8 kHz deviation as indicated on AN/URM-103 meter.
8. Set TS-723A/U function switch to METER and tune AN/URM-103 frequency to 60.05 MHz as indicated by maximum indication on TS-723A/U meter.
9. Set control unit SQUELCH switch to CARR.
10. Reduce AN/URM-103 rf output to minimum, then slowly increase output to a point where squelch just breaks.
11. If receiver-transmitter breaks squelch at an input of more than 0.7 microvolt, rotate R5216 on A5500 assembly counterclockwise so that squelch breaks at 0.55 microvolt.
12. Remove AN/URM-103 input to receiver-transmitter, rotate SQ ADJ control fully counter-clockwise, and ensure unit is unsquelched.
13. Rotate SQ ADJ control clockwise until receiver-transmitter just squelches.

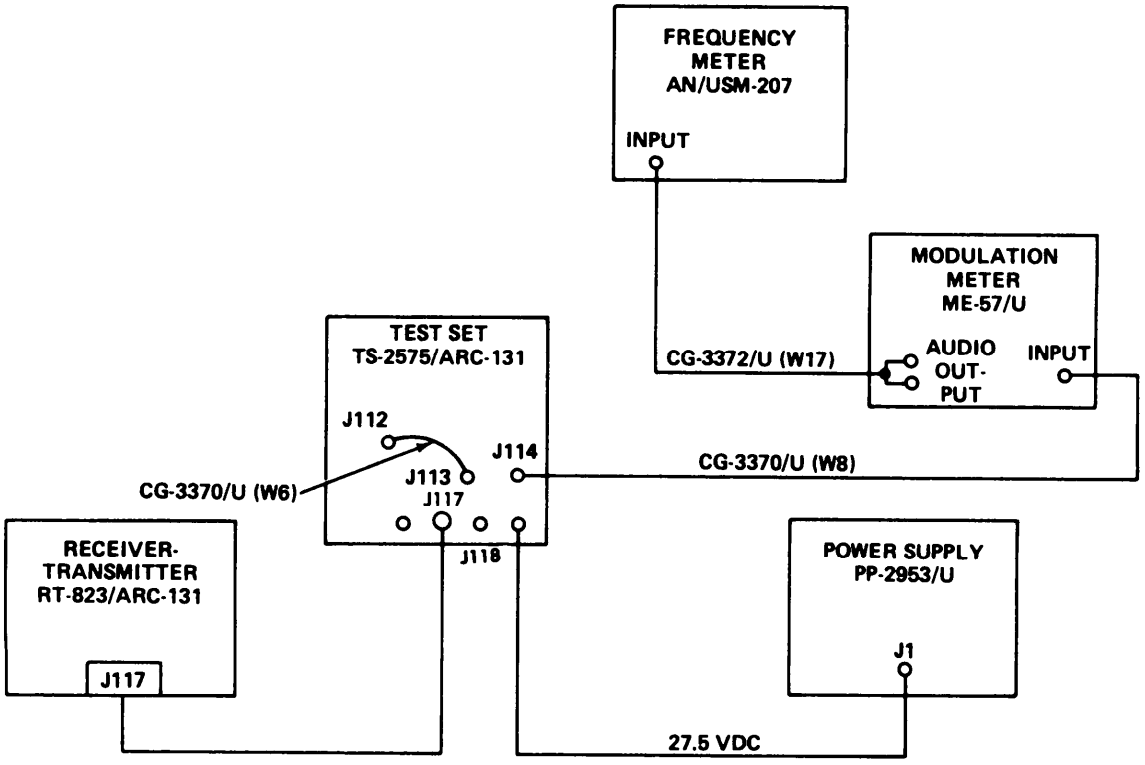
2-32. 150 Hz TONE MODULATION FREQUENCY AND DEVIATION ADJUSTMENT.

TEST EQUIPMENT AND MATERIALS

Maintenance Kit MK-1035/ARC-131
Electronic Counter Digital Readout AN/USM-207
Modulation Meter ME-57/U
Power Supply PP-2953/U
All cables are part of MK-1035/ARC

TEST SETUP

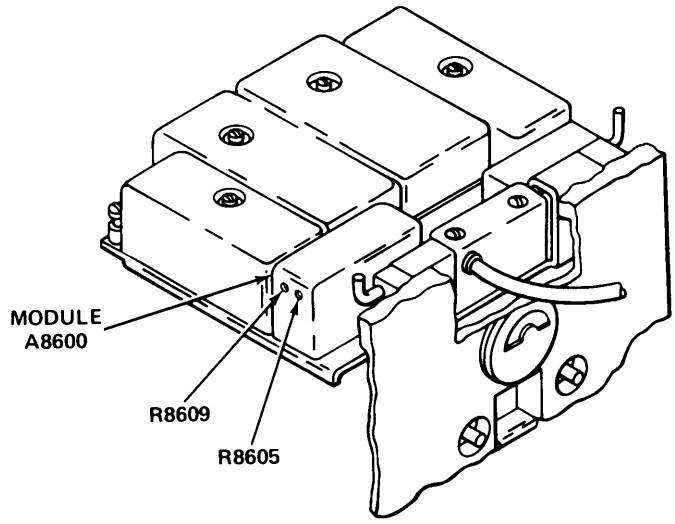
Connect equipment as shown in test setup diagram. Turn on all equipment and allow at least 5 minutes for warmup.



ADJUSTMENT PROCEDURE

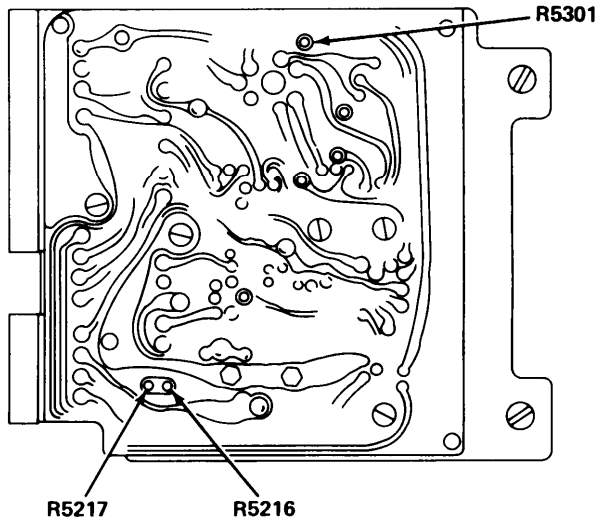
1. Place +28 VDC ON-OFF switch on TS-2575/ARC-131 to ON.
2. Place XMTR HI-LO switch on receiver-transmitter to LO.
3. Set WIDE BAND - NARROW BAND switch on TS-2575/ARC-131 to NARROW BAND.
4. Set control unit mode switch to T/R, VOL control fully clockwise, SQUELCH switch to TONE, and frequency selectors to 80.05 MHz.
5. Set RF AMP ALIGN HI-LO switch on TS-2575/ARC-131 to LO.

2-32. 150 Hz TONE MODULATION FREQUENCY AND DEVIATION ADJUSTMENT. (CONT)



EL1AT242

6. Adjust potentiometer R8609 on module A8600 fully clockwise.
7. Place TRANSMIT switch on test set to ON.



EL1AT239

8. Adjust R5301 on A5500 assembly for 150 ± 2 Hz indication on frequency meter AN/USM-207.
9. Adjust potentiometer R8609 on module A8600 for 3 kHz deviation as indicated on deviation meter.

2-33. TONE SQUELCH ADJUSTMENT.

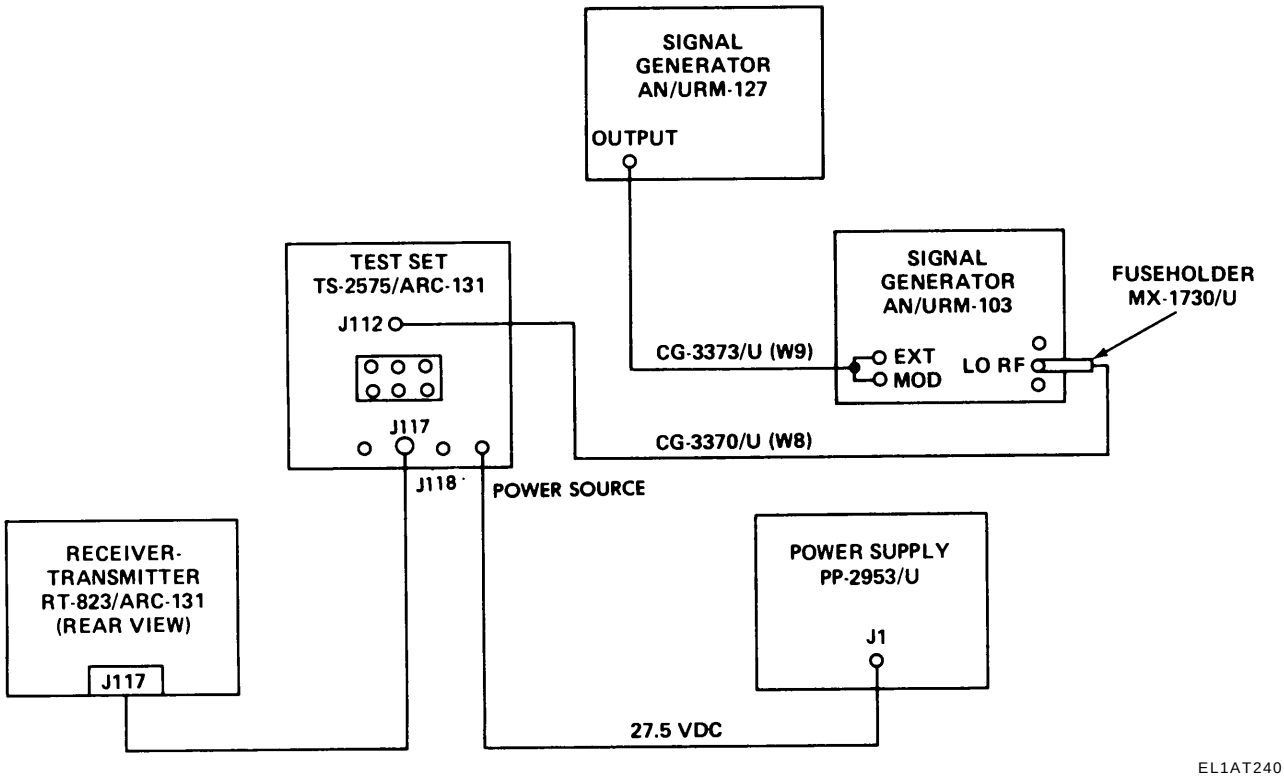
TEST EQUIPMENT AND MATERIALS

Maintenance Kit MK-1035/ARC-131
Signal Generator AN/URM-103
Signal Generator AN/URM-127
Power Supply PP-2953/U
Fuseholder MX-1730/U
All cables are part of MK-1035/ARC
TEST SETUP

Connect equipment as shown in test setup diagram. Turn on all equipment and allow at least 5 minutes warmup.

NOTE

Ensure control unit C-7088/ARC-131 installed in test set has a jumper wire connected between E3 and E4 of switch rear mounting bracket marked TONE, before performing TONE squelch adjustments.

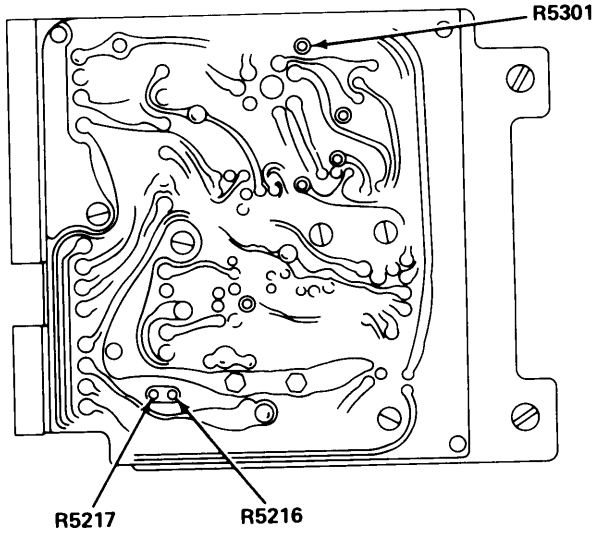


EL1AT240

2-33. TONE SQUELCH ADJUSTMENT. (CONT)

ADJUSTMENT PROCEDURE

1. Place +28 VDC ON-OFF switch on test set to ON.
2. Set control unit mode switch to T/R, VOL control fully clockwise, SQUELCH switch to TONE, and frequency selectors to 60.05 MHz.
3. Set Signal Generator AN/URM-127 amplitude control to 0, and adjust output frequency to 150 Hz.
4. Set Signal Generator AN/URM-103 FUNCTION selector switch to EXT MOD, and adjust for a 10 microvolt output at 60.05 MHz.
5. Adjust Signal Generator AN/URM-127 for 3 kHz deviation as indicated on AN/URM-103 modulation meter.



EL1AT239

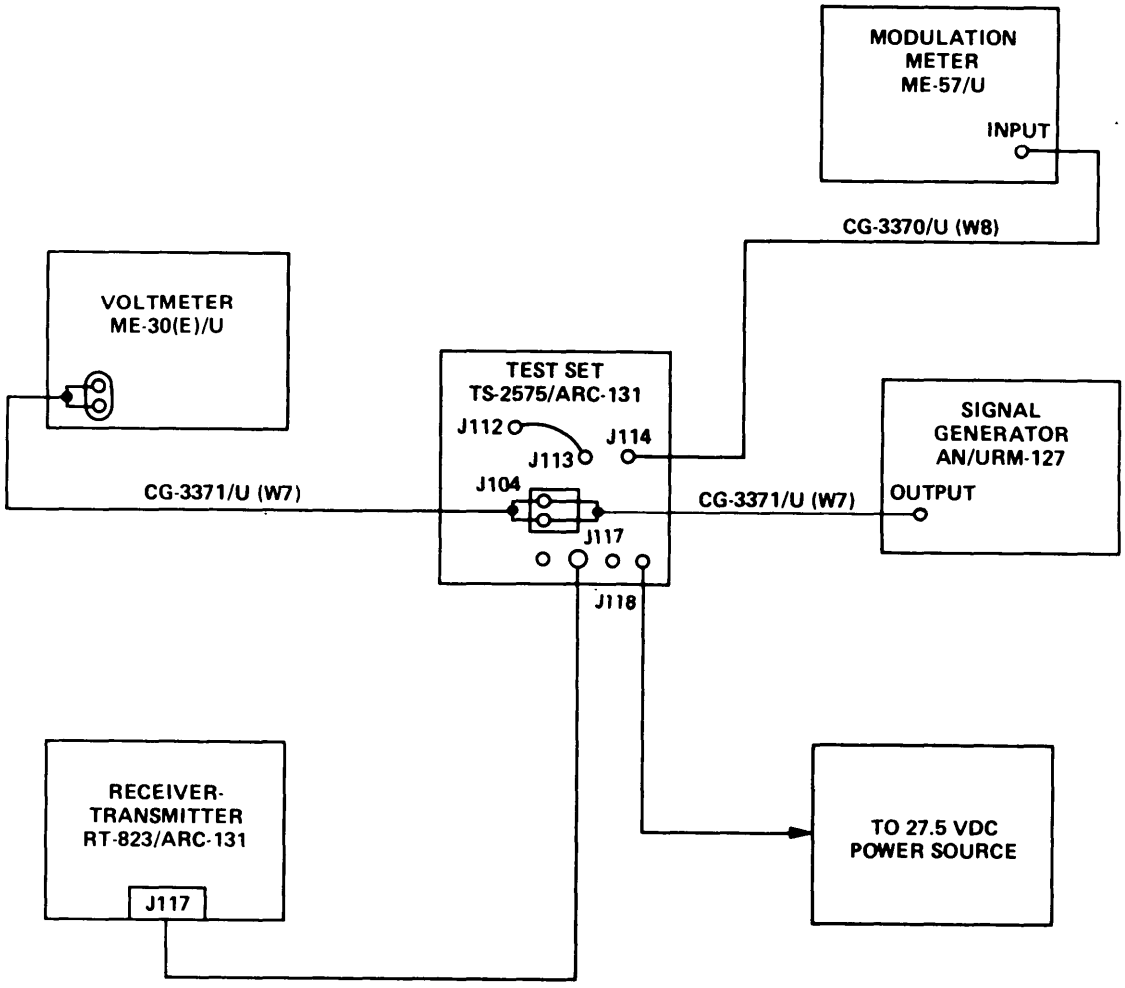
6. Adjust potentiometer R5217, on A5500 assembly, so receiver-transmitter just unsquelches.

2-34. NARROW BAND DEVIATION ADJUSTMENT.

TEST EQUIPMENT AND MATERIALS

Maintenance Kit MK-1035/ARC-131
Modulation Meter ME-57/U
Signal Generator AN/URM-127
Voltmeter ME-30E/U
Power Supply PP-2953/U
All cables are part of MK-1035/ARC
TEST SETUP

Connect equipment as shown in test setup diagram. Turn on all equipment and allow at least 5 minutes for warmup.



EL1AT241

2-34. NARROW BAND DEVIATION ADJUSTMENT. (CONT)

INITIAL EQUIPMENT CONTROL SETTINGS

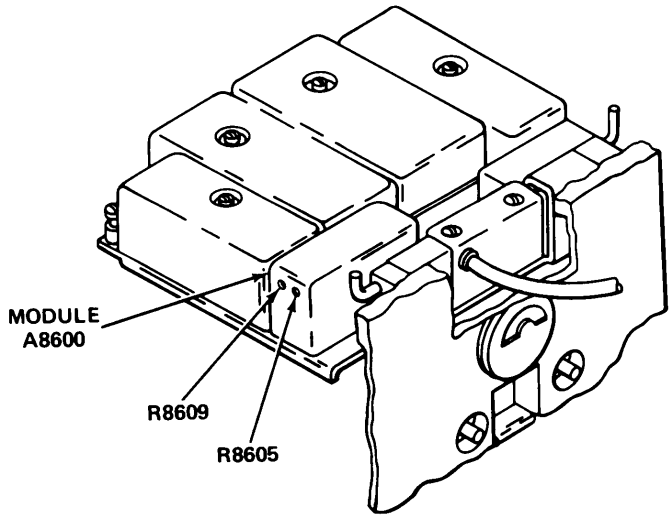
Set equipment controls as indicated in the following table.

CONTROL AND SWITCH SETTINGS

EQUIPMENT	CONTROL OR SWITCH	POSITION/SETTING
TS-2575/ARC-131	MODE SWITCH	T/R
	VOL	fully clockwise
	SQUELCH switch	DIS
	FREQ sel	60.05 MHz
	WIDE BAND-NAR BAND	WIDE BAND
	TRANSMIT switch	OFF
AN/URM-127	OUTPUT FREQUENCY	1000 Hz
	AMPLITUDE CONTROL	0.39 volt as observed on ME-30E/U

ADJUSTMENT PROCEDURE

1. Set TS-2575/ARC-131 TRANSMIT switch to ON.



EL1AT242

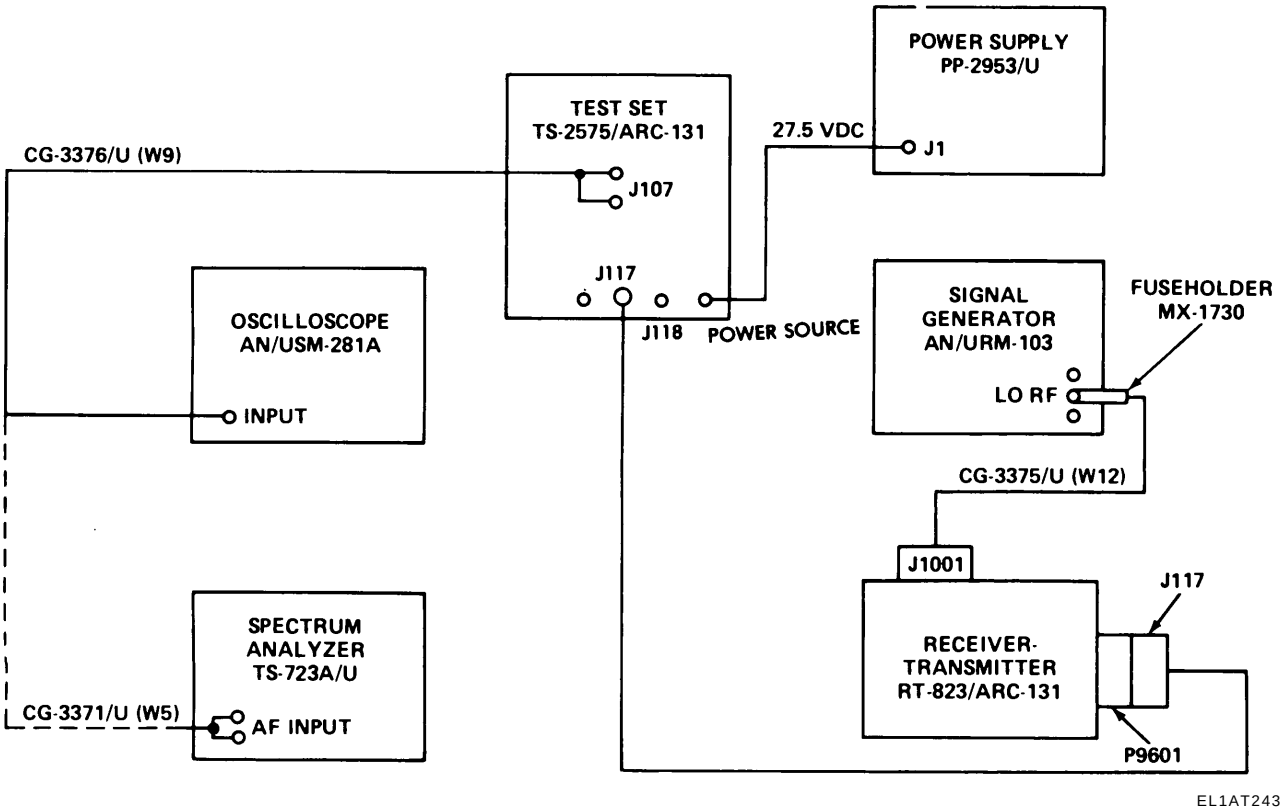
2. Adjust potentiometer R8605, on module A8600, to provide 8 kHz deviation as indicated on deviation meter.

RECEIVER SENSITIVITY ADJUSTMENTS.

TEST EQUIPMENT AND MATERIALS

Maintenance Kit MK-1035/ARC-131
Signal Generator AN/URM-103
Oscilloscope AN/USM-281A
Power Supply PP-2953/U
Fuseholder MX-1730/U
Spectrum Analyzer TS-723A/U.
All cables are part of MK-103/ARC
TEST SETUP

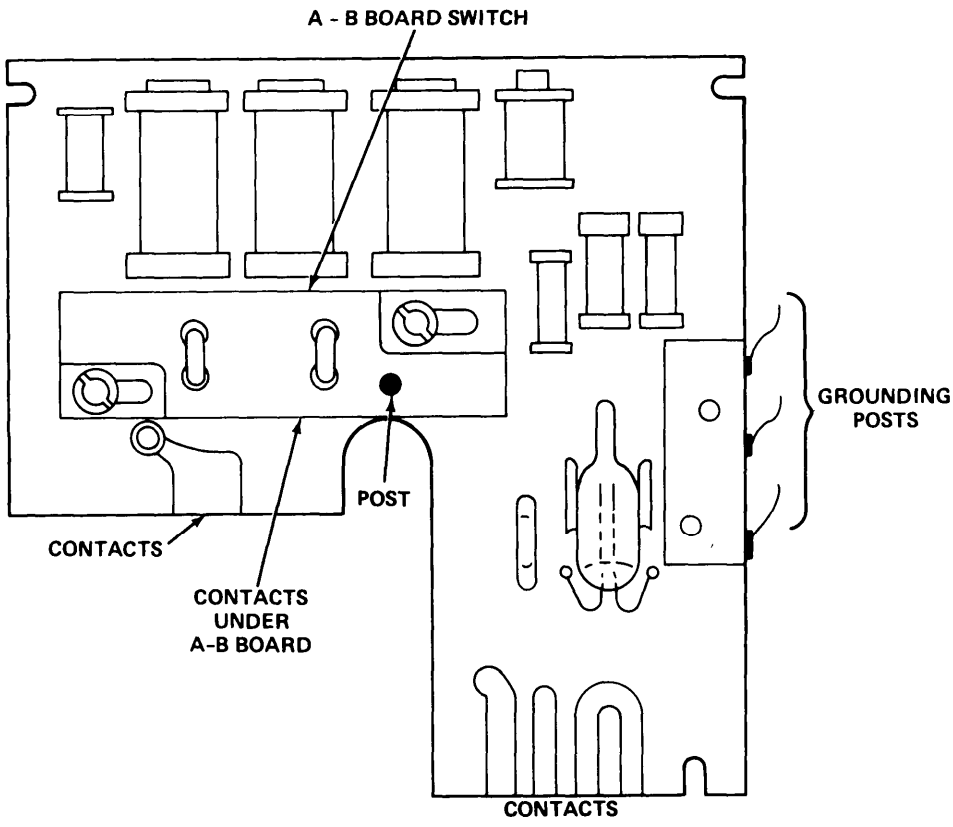
Connect equipment as shown in test setup diagram. Turn on all equipment and allow at least 5 minutes for warmup.



ADJUSTMENT PROCEDURE

1. Set control unit C-7088/ARC-131 mode switch on test set to OFF.
2. Remove cover from A1000 VHF TUNER (para 2-68).
3. Set control unit SQUELCH switch to DIS, mode switch to T/R, and frequency selectors to 30.00 MHz.
4. Set signal generator AN/URM-103 to 30.00 MHz with 8 kHz deviation and 1000 Hz modulation.
5. Lower rf attenuator of signal generator until signal drops off. If sine wave on oscilloscope and audio voltage on distortion analyzer drop off with considerable static before 0.5 microvolt, perform steps 6, 7, and 8.

2-35. RECEIVER SENSITIVITY ADJUSTMENTS. (CONT)



6. Using board extractor, remove A1100 module from its mount. Inspect A-B board switch for a broken post. If post is broken, replace module. Clean contacts by rubbing with a pencil eraser. Ensure grounding posts are in direct contact with A1000 can.

CAUTION

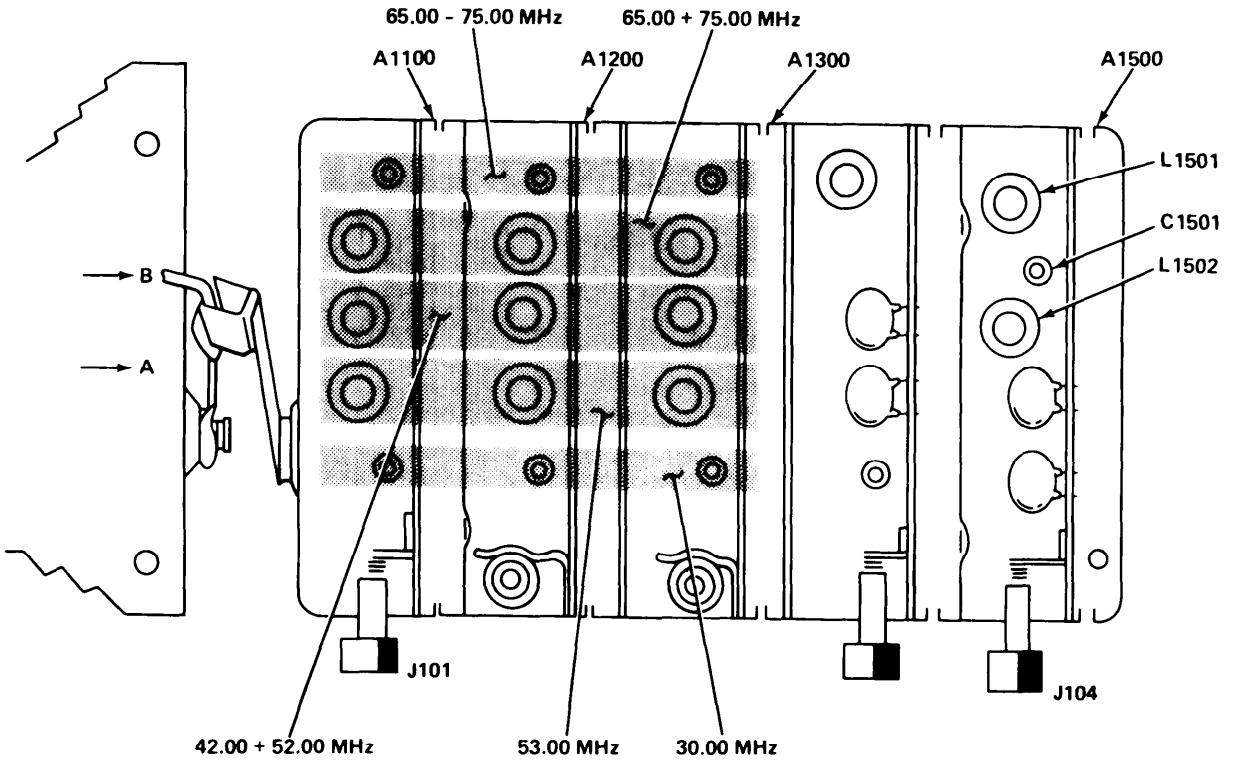
If post on A-B board switch does not fit in fork, the post will be broken the first time band switch actuator changes position, and receiver will not work.

7. Position band switch so post will fit into fork on band switch actuator, then reinstall module.
8. Repeat steps 6 and 7 for A1200 module, then A1300 module, taking care to insert post into fork in band switch actuator when reinstalling each module.

2-35. RECEIVER SENSITIVITY ADJUSTMENTS. (CONT)

ADJUSTMENT PROCEDURE (CONT)

9. Repeat step 5, and if signal still drops off, run signal generator up and down band to determine if local oscillator is off frequency. This can be determined by hearing an audio signal at a frequency other than 30 MHz. If this proves to be the case, perform local oscillator alinement (para 2-36), then repeat step 5. If signal drops off prior to 0.5 microvolt, perform steps 10 through 14.

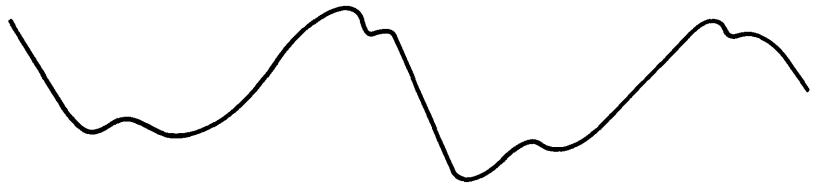


EL1AT245

10. With a small jeweler's screwdriver, adjust the 30 MHz variable capacitors on the A1100, A1200, and A1300 modules for a peak in either sine wave or audio signal spectrum analyzer. When a clear or maximum signal is obtained, lower rf attenuator of signal generator and continue adjusting until no further improvement can be made.
11. Change frequency to 53.00 MHz and repeat step 10, tuning 53.00 MHz coils with a nonmetallic alinement tool.
12. Change frequency to 52.00 MHz and repeat step 10, tuning 42.00 and 52.00 MHz coils with a nonmetallic alinement tool.

2-35. RECEIVER SENSITIVITY ADJUSTMENTS. (CONT)

13. Change frequency to 75.00 MHz and repeat step 10, tuning 65.00 and 75.00 MHz coils using a nonmetallic alinement tool.
14. With frequency at 75.00 MHz, repeat step 10, tuning the 65.00 and 75.00 MHz capacitors using a small jeweler's screwdriver.
15. If tests are still unsuccessful, substitute boards as necessary and repeat alinement procedures, or refer radio to higher level of maintenance.



TYPICAL DISTORTED SIGNAL

EL1AT246

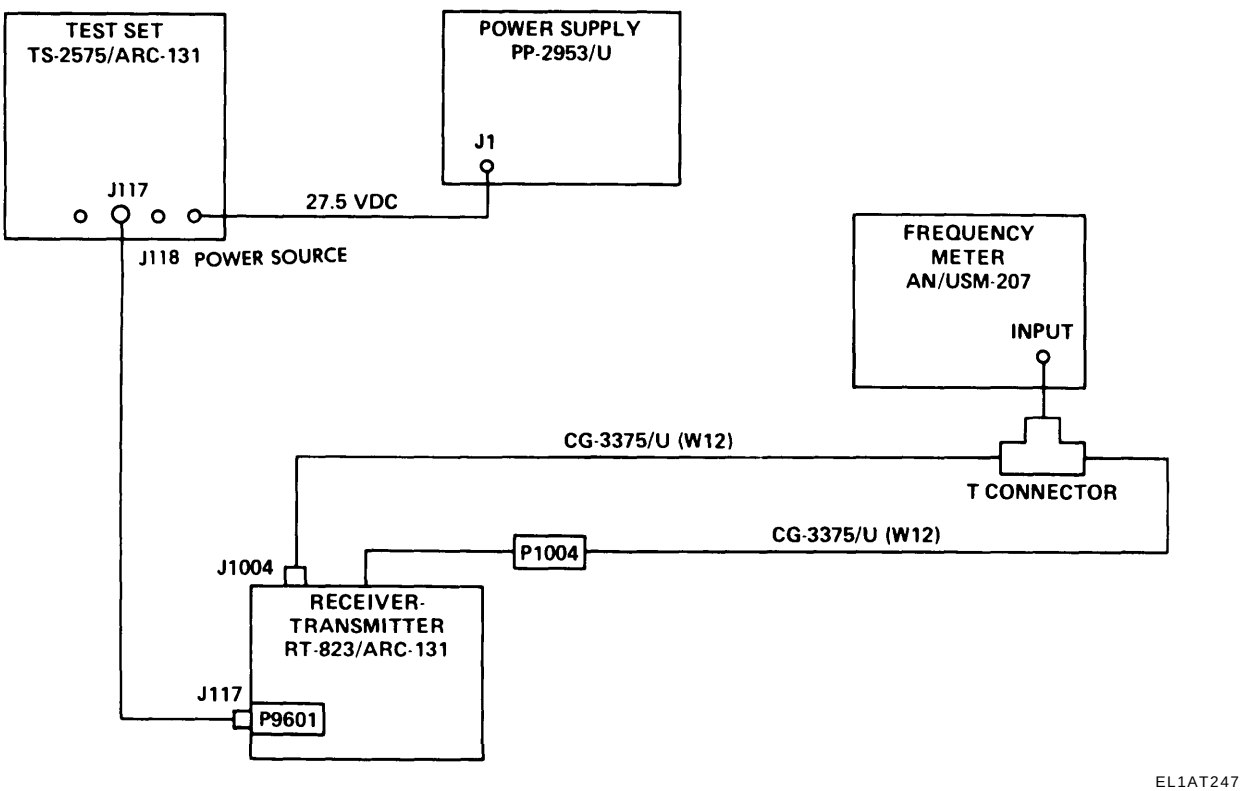
16. If a distorted signal is observed, perform steps 17 through 23.
17. Attach CG-3376/U from J107 on test set to INPUT of oscilloscope.
18. Connect test set to RT-823/ARC-131 with J117.
19. Use CG-3370/U to connect Signal Generator AN/URM-103 (LO-RF) to test set at J112.
20. Set control unit and signal generator to corresponding frequencies.
21. Set control unit mode switch to T/R.
22. Using screwdriver, unscrew if. amplifier board A4000 and lift up to gain access to two variable coils on the side.
23. With a nonmetallic alinement tool, adjust the two coils while observing signal on oscilloscope. Adjust slowly and observe signal to adjust its symmetry.

2-36. LOCAL OSCILLATOR ALINEMENT.

TEST EQUIPMENT AND MATERIALS

Maintenance Kit MK-1035/ARC-131
Power Supply PP-2953/U
Frequency Meter AN/USM-207
T-Connector
All cables are part of MK-1035/ARC
TEST SETUP

Connect equipment as shown in test setup diagram. Turn on all equipment and allow at least 5 minutes for warmup.



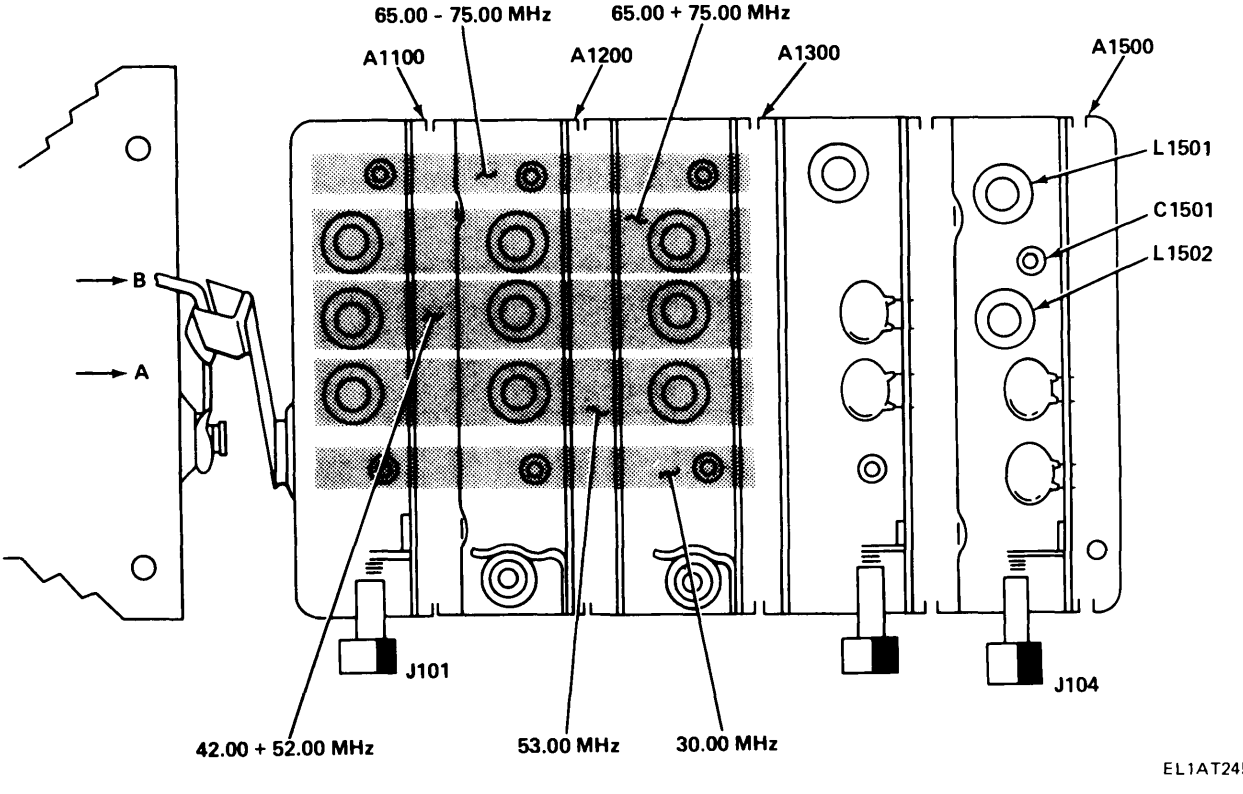
ALINEMENT PROCEDURE

1. Set control unit mode switch to T/R.
2. When RT-823/ARC-131 is on a frequency range of 30.00 to 52.95 MHz, frequency counter will read that frequency plus 11.5 MHz. When RT-823/ARC-131 is on a frequency range from 53.00 to 75.95 MHz, the frequency counter will read that frequency minus 11.5 MHz. See the following table.

2-36. LOCAL OSCILLATOR ALINEMENT. (CONT)

CONTROL UNIT FREQUENCY (MHz)		FREQUENCY COUNTER READOUT (MHz)
A BAND	B BAND	
30.00 42.00 52.00	53.00 65.00 75.00	41.50 ± 0.002 53.50 ± 0.002 63.50 ± 0.002

3. If frequency reading is not within tolerances of table, perform the following adjustments.
4. Remove J1004 from P1004 on receiver-transmitter. This removes lock-in.



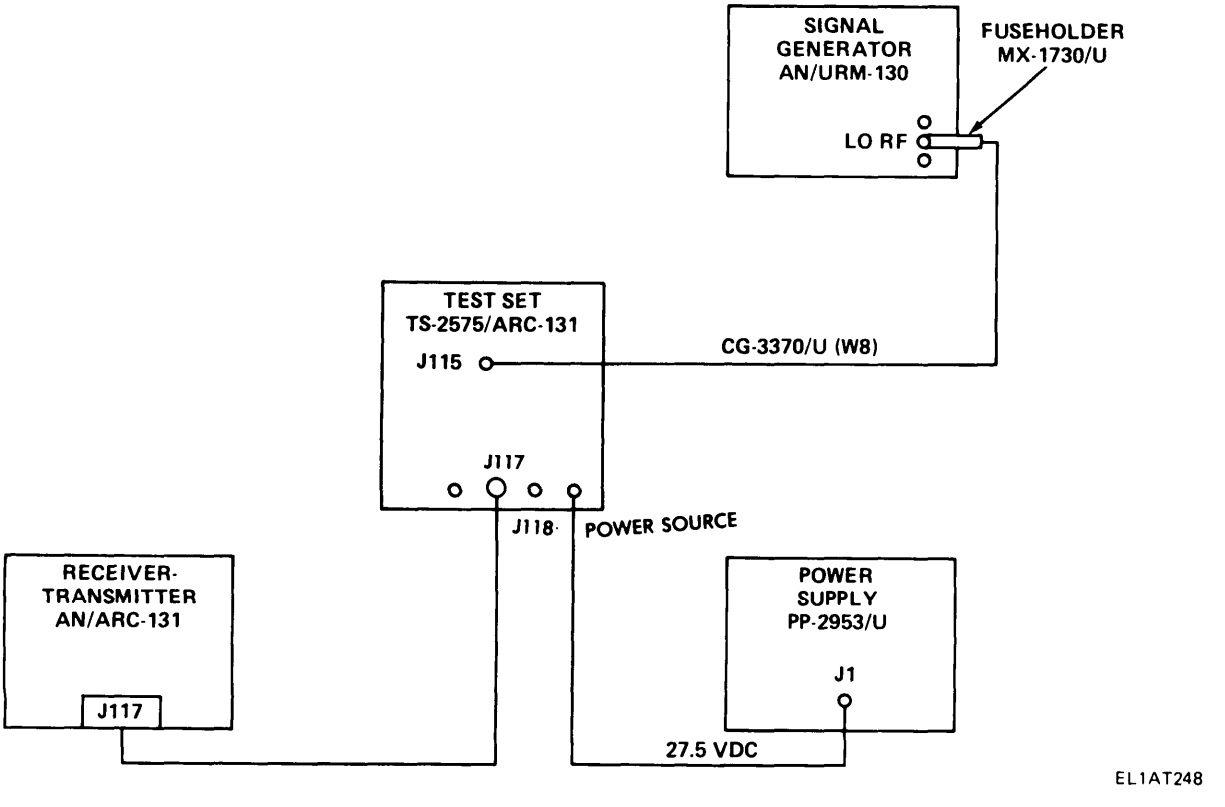
5. At 30.00 MHz, adjust L1502 until reading on frequency counter is 41.50 ± 0.002 MHz. Switch to 42.00 MHz and adjust C1501 until frequency counter reading is 53.50 ± 0.002 MHz. Switch to 52.00 and adjust L1501 until frequency counter reading is 63.50 ± 0.002 MHz.
6. Replace J1004 and check frequencies. It maybe necessary to repeat step 5 a few times since components affect each other.

2-37. HOMING ADJUSTMENT.

TEST EQUIPMENT AND MATERIALS

Maintenance Kit MK-1035/ARC-131
Signal Generator AN/URM-103
Power Signal PP-2953/U
Fuseholder MX-1730/U
All cables are part of MK-1035/ARC
TEST SETUP

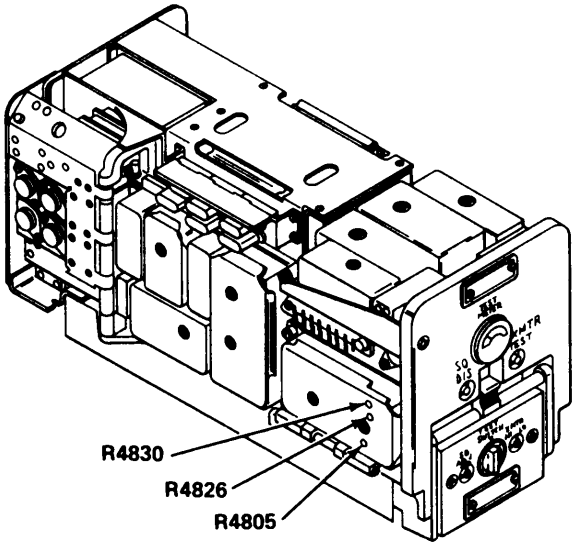
Connect equipment as shown in test setup diagram. Turn on all equipment and allow at least 5 minutes for warmup.



ADJUSTMENT PROCEDURE

1. Set control unit mode switch to HOME, SQUELCH switch to CARR, and frequency selectors to 31.00 MHz.
2. Set test set LEFT and RIGHT HOMER ATTEN to 0 db.
3. Tune signal generator to 31.00 MHz and adjust LO-HI RF SET TO LINE control for minimum output.

2-37. HOMING ADJUSTMENT. (CONT)



EL1AT249

4. Adjust vertical needle adjust potentiometer R4805, located on homer-detector amplifier assembly for a center-scale indication on homing indicator.
5. Vary signal generator output from minimum signal to 10 microvolt. Flags on homing indicator should disappear when signal generator output is 1.2 microvolt or less; vertical needle should stay centered (± 1/8 inch).
6. Set signal generator output to 35 microvolt and adjust horizontal needle potentiometer R4830, located on homer-detector amplifier assembly, so homing indicator horizontal needle is 1/8 inch below center of indicator.
7. Adjust signal generator output for 10 microvolt. Set test set LEFT HOMER ATTEN to 3 db, and adjust center course sensitivity potentiometer R4826 so homing indicator vertical needle deflects right of center one-half of full scale.
8. Set RIGHT HOMER ATTEN to 3 db and LEFT HOMER ATTEN to 0 db. Repeat step 7 and ensure homing indicator vertical needle deflects left of center one-half of full scale.

Section V REPAIR AND REPLACEMENT PROCEDURES

Subject	Para	Page
General	2-38	2-151
Receiver-Transmitter, RT-823/ARC-131		
RT Case Replacement	2-39	2-152
Homing Module A4800 Replacement	2-40	2-153
A4000 Modules and Assembly Replacement	2-41	2-154
A9500 Assembly Replacement	2-42	2-159
A3000 Modules and Assembly Replacement	2-43	2-160
A5500 Modules and Assembly Replacement	2-44	2-186
A8700 Modules and Assembly Replacement	2-45	2-172
A6600 Assembly Replacement	2-46	2-177
Power Supply Circuit Card Replacement	2-47	2-178
A6300 and A6400 Module Replacement	2-48	2-180
A4500 Assembly Replacement	2-49	2-182
A2100 Assembly Replacement	2-50	2-184
Front Panel Replacement	2-51	2-185
A1100 Through A1500 Module Replacement	2-52	2-186
TEST METER M9601 Replacement	2-53	2-189
SQ DIS Switch S9802 and XMTR TEST Switch S9803 Replacement	2-54	2-190
TEST SWITCH S9801 Replacement	2-55	2-192
SQ ADJ Switch R9802 Replacement	2-56	2-194
XMTR HI-LO Switch S9604 Replacement	2-57	2-195
A6500 Assembly Replacement	2-58	2-198
Radio Interference Filter FL9601 Replacement	2-59	2-198
Transistor Q9801 Replacement	2-60	2-200
A4900 Assembly Replacement	2-61	2-202
RF Attenuator and Diode Switch Z4501 Replacement	2-62	2-203
Reflectometer and Sidetone Detector Z4502 Replacement	2-63	2-204
Low-Pass Filter FL4501 Replacement	2-64	2-205
Relays K4501 Through K4504 Replacement	2-65	2-206
Relays K9601 Through K9808 Replacement	2-66	2-207
A1000, A2000, A8000, and A9700 Assembly Replacement	2-67	2-208
A1000 Assembly Replacement	2-68	2-214
A6000 Assembly Replacement	2-69	2-216
A2000 Assembly Replacement	2-70	2-218
A9700 Assembly Replacement	2-71	2-219
Relay K3001 Replacement	2-72	2-220
A1800 Assembly Replacement	2-73	2-221

Subject	Para	Page
Control Unit C-7088/ARC-131		
Front Panel Knobs Replacement	2-74	2-222
Front Panel Dial Mask Replacement	2-75	2-224
Light Panel Replacement	2-76	2-225
Switch and Wiring Assembly Replacement	2-77	2-226
Squelch Switch S9106 Replacement	2-78	2-228
Volume Control Switch R9103 Replacement	2-79	2-230
Tenths Frequency Selector switch S9103 and/or Hundreths Frequency Selector Switch S9104 Replacement	2-80	2-232
Mode Switch S9105 Replacement	2-81	2-234
Electrical Connector J9101 Replacement	2-82	2-238
Tens Frequency Selector Switch S9101 Replacement	2-83	2-240
Units Frequency Selector Switch S9102 Replacement	2-84	2-244

2-38. GENERAL.

This section provides instructions for general support maintenance of Radio Set AN/ARC-131 and its components. The following initial setup information applies to all procedures.

Resources required are not listed unless they apply to the particular procedure.

Personnel are listed only if task requires more than one technician.

Normal standard equipment condition to start a maintenance task is power off and disconnected from power source. Equipment condition is not listed unless some other condition is required.

All soldering will be in accordance with TB SIG 222.

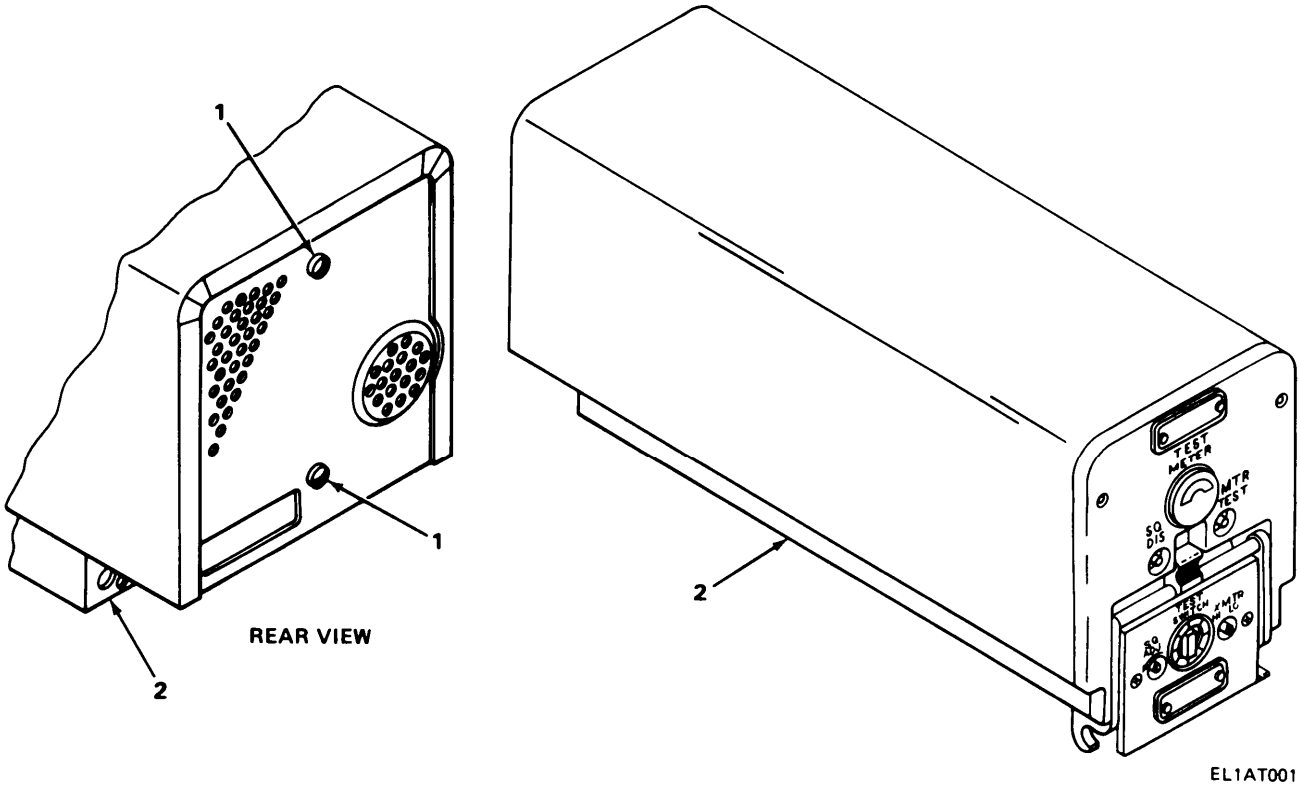
All soldering must be done quickly and where wiring permits, use heat sink pliers to dissipate excessive heat. Use an isolating transfer when only an ac operated soldering iron is available. Do not use a soldering gun. Do not use a soldering iron rated at over 40 watts because excessive heat may damage components.

Observe all WARNINGS, CAUTIONS, and NOTES to prevent injury to personnel and damage to equipment.

Use Tool Kit, Electronic Equipment TK-100/G and Tool Kit, Electronic Equipment TK-105/G for all procedures unless otherwise specified.

2-39. RT CASE REPLACEMENT.

MATERIALS/PARTS: Case, receiver-transmitter (P/N SMD619940)



REMOVAL

1. Using screwdriver, loosen two turn-lock fasteners (1).
2. Carefully pull case (2) off chassis.

INSTALLATION

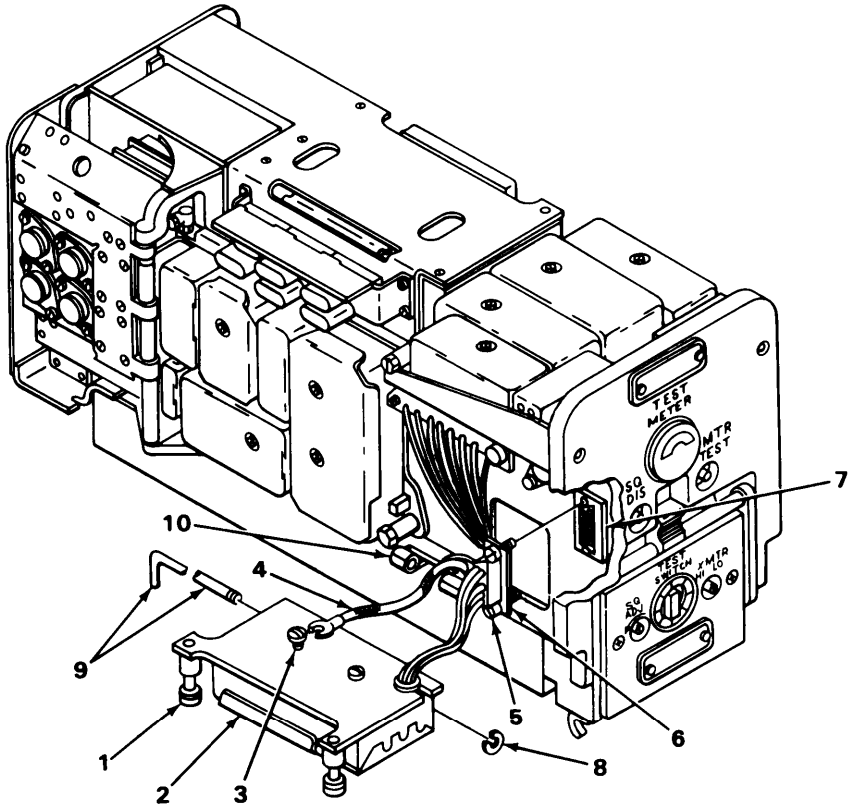
CAUTION

Care must be taken when performing next step to prevent pinching or breaking wires.

1. Install case (2) on chassis.
2. Using screwdriver, tighten two turn-lock fasteners (1).

2-40. HOMING MODULE A4600 REPLACEMENT.

MATERIALS/PARTS: Module, homing, A4800 (P/N SMD619582)
PRELIMINARY PROCEDURE: Remove case (para 2-39).



EL1AT002

REMOVAL

1. Using screwdriver, loosen two captive screws (1) and lower module (2).
2. Using screwdriver, loosen screw (3) and remove ground strap (4).
3. Using screwdriver, loosen two captive screws (5) and pull P4801 connector (6) free from J4801 connector (7).
4. Remove C-clip (8) from hinge pin (9), and remove hinge pin from hinge (10).
5. Remove module (2).

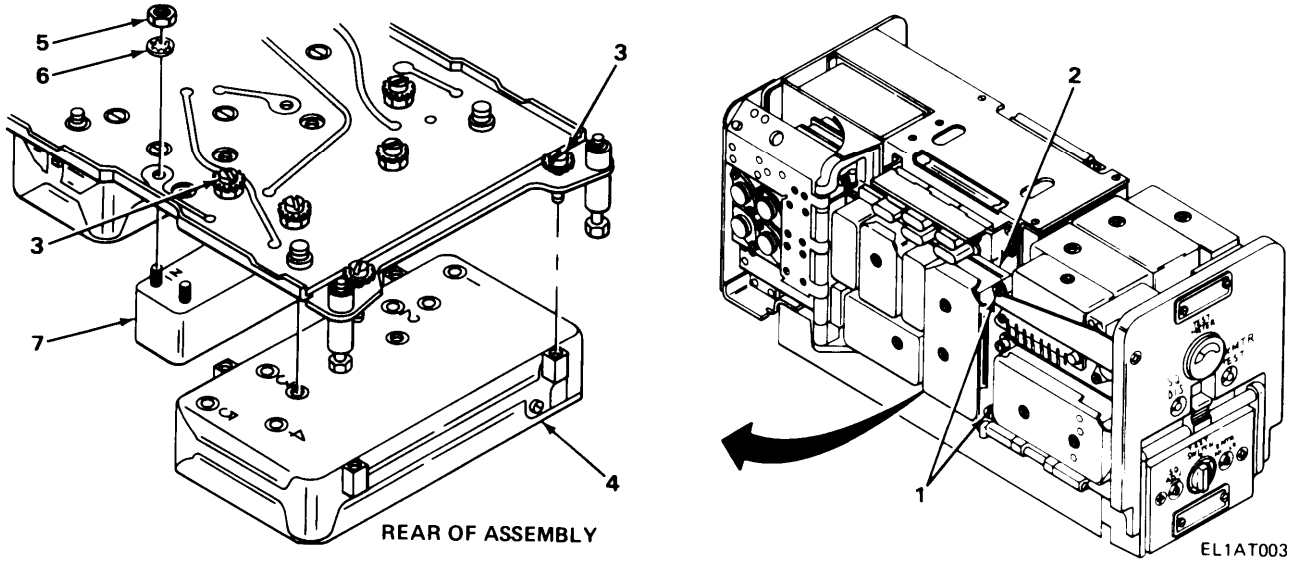
INSTALLATION

1. Position module (2) on hinge (10) and install hinge pin (9) and C-clip (8).
2. Install P4801 connector (6) on J4801 connector (7), and tighten two captive screws (5).
3. Position ground strap (4) under screw (3), and using screwdriver, tighten screw (3).
4. Raise module (2) and tighten two captive screws (1).

FOLLOW-ON MAINTENANCE: Install case (para 2-39).

2-41. A4000 MODULES AND ASSEMBLY REPLACEMENT.

MATERIALS/PARTS: Amplifier assembly, if. A4100 (P/N SMC413726)
Amplifier assembly, if. A4000 (P/N SME619985)
Amplifier, frequency, audio, A4300 (P/N SMB413785)
Discriminator, frequency, electrical, A4200 (P/N SMC413753)
Filter, band-pass, FL4001 (P/N SMD413720)
Filter, band-pass, FL4002 (P/N SMD413719)
PRELIMINARY PROCEDURE: Remove case (para 2-39).



REMOVAL

1. Using screwdriver, loosen two captive screws (1) and swing out assembly (2).

NOTE

Assembly can be removed with or without first removing modules. If assembly is to be removed without removing modules, proceed to step 6.

Modules A4100 through A4300 are secured with captive screws. Steps 2 and 3 are typical for all modules.

2. Using screwdriver, loosen captive screws (3).
3. Carefully pull module (4) off board to release from pins. Do not twist from side to side.

CAUTION

Care must be taken when performing next step to prevent damaging test points on printed circuit board.

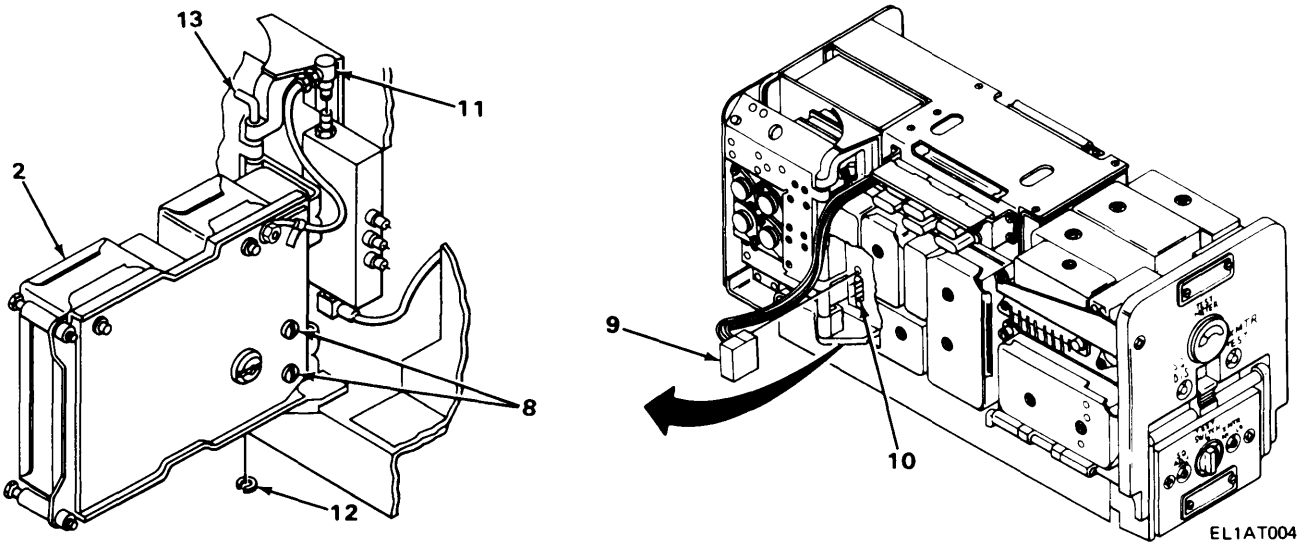
2-41. A4000 MODULES AND ASSEMBLY REPLACEMENT. (CONT)

NOTE

Modules FL4001 and FL4002 are secured with locknuts. Steps 4 and 5 are typical for both modules.

Note position of FL4002 module for 50 kHz or WIDE BAND operation mode.

4. Using wrench, remove locknuts (5) and IT lockwashers (6).
5. Carefully pull module (7) off board.



6. Using screwdriver, loosen two captive screws (8).
7. Carefully lift P4001 (9) off pins (10).
8. Disconnect blue wire (P4902) (11) from J4902.
9. Remove C-clip (12) from hinge pin (13) and remove hinge pin.
10. Remove assembly (2).

INSTALLATION

CAUTION

Before installing assembly, ensure pins (1) are not bent. Straighten any bent pins. Extreme care must be taken not to damage pins.

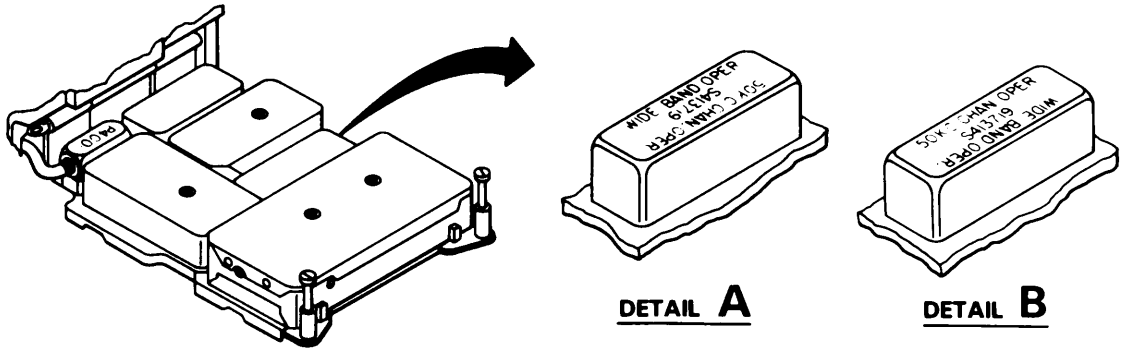
1. Position assembly (2) in hinge and install hinge pin (13).
2. Install C-clip (12) on hinge pin (13).

NOTE

If modules were not removed from assembly, proceed to step 7 for installation of assembly.

2-41. A4000 MODULES AND ASSEMBLY REPLACEMENT. (CONT)

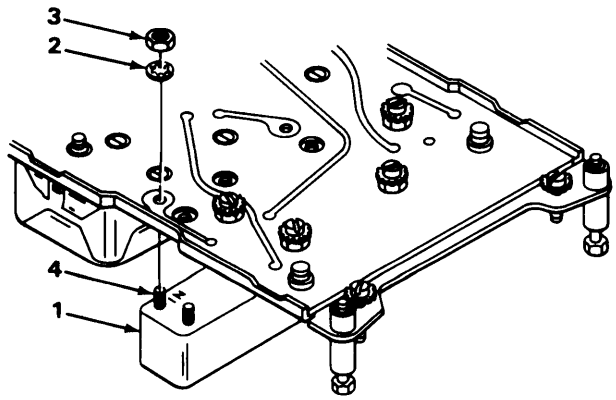
INSTALLATION (CONT)



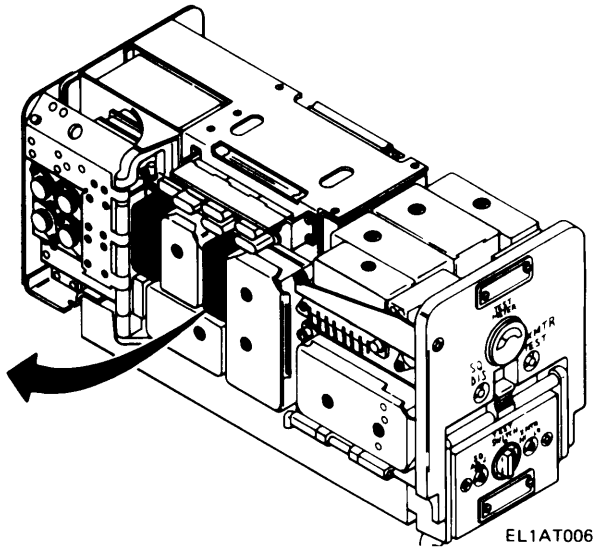
EL1AT005

NOTE

Before installing FL4002 filter, establish whether a 50 kHz or WIDE BAND operation mode will be used. The position of FL4002 filter will depend on operation mode selected. See detail A for 50 KC operation mode and detail B for WIDE BAND operation mode.



REAR OF ASSEMBLY



EL1AT006

NOTE

Modules FL4001 and FL4002 are secured with locknuts. Steps 3 and 4 are typical for both modules.

Module location is stamped on board.

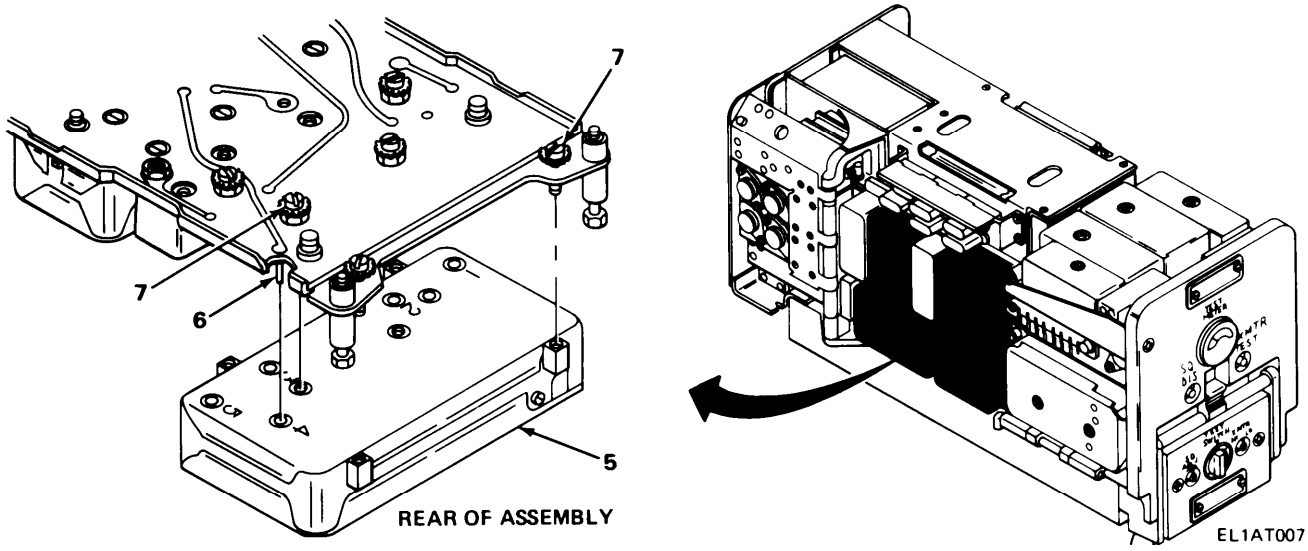
2-41. A4000 MODULES AND ASSEMBLY REPLACEMENT. (CONT)

3. Position module (1) on board and install IT lockwashers (2) and locknuts (3) on studs (4).

CAUTION

Care must be taken when performing next step to prevent damaging printed circuit board. Do not overtighten.

4. Using wrench, tighten locknuts (3).



CAUTION

Before installing modules, ensure pins are not bent. Straighten any bent pins. Extreme care must be taken not to damage pins.

NOTE

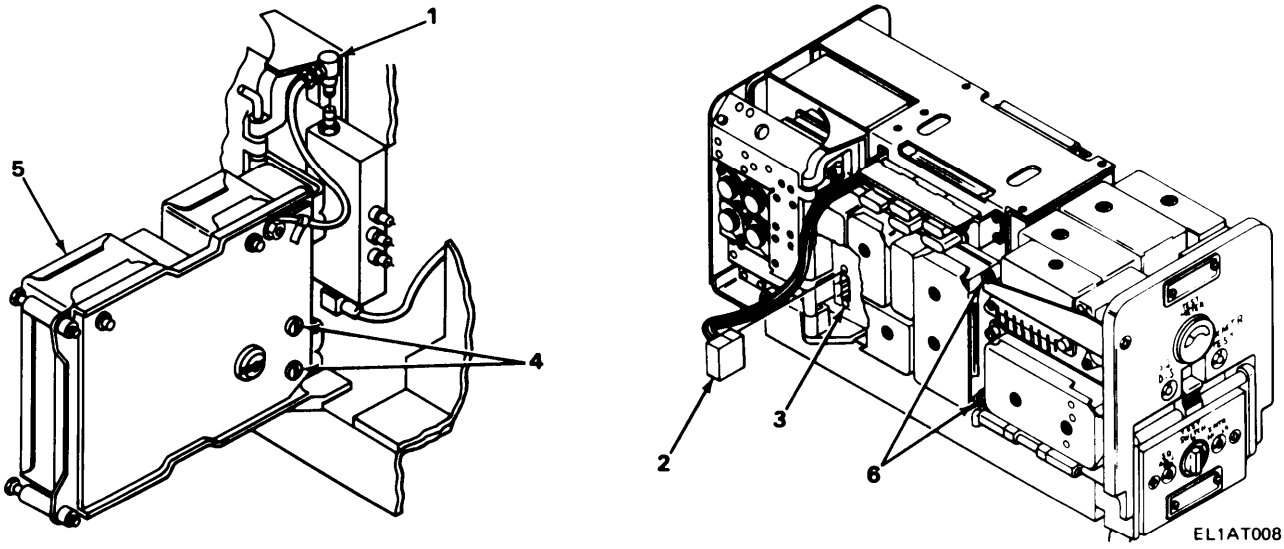
Modules A4100 through A4300 are secured with captive screws. Steps 5 and 6 are typical for all modules.

Module location is stamped on board.

5. Position module (5) on pins (6) and push into place.
6. Using screwdriver, tighten captive screws (7).

2-41. A4000 MODULES AND ASSEMBLY REPLACEMENT. (CONT)

INSTALLATION (CONT)



7. Connect blue wire (P4902) (1) to J4902.

CAUTION

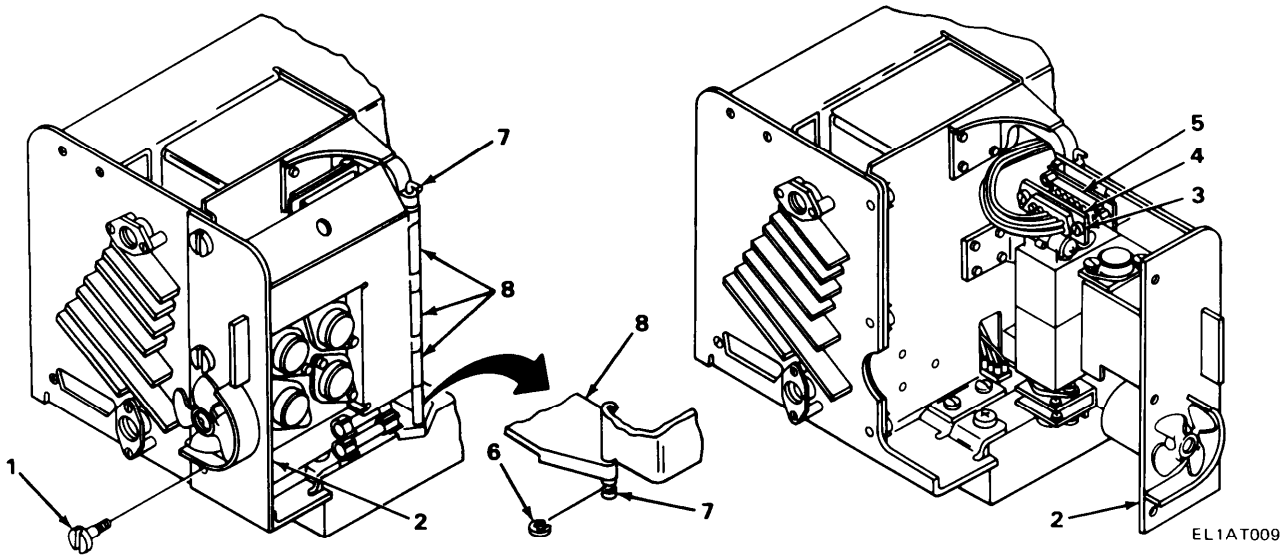
Care must be taken when performing next step to prevent damaging pins on assembly.

8. Position P4001 (2) on pins (3) and push into place.
9. Using screwdriver, tighten two captive screws (4).
10. Swing assembly (5) into position.
11. Using screwdriver, tighten two captive screws (6).

FOLLOW-ON MAINTENANCE: Install case (para 2-39).

2-42. A9500 ASSEMBLY REPLACEMENT.

MATERIALS/PARTS: Power supply assembly A9500 (P/N SME619765)
PRELIMINARY PROCEDURE: Remove case (para 2-39).



REMOVAL

1. Using screwdriver, remove three shouldered screws (1) and swing open assembly (2).
2. Using screwdriver, loosen two captive screws (3) and pull P9501 (4) free from J9501 (5).
3. Remove C-clip (6) from hinge pin (7).
4. Remove hinge pin (7) from hinge (8) and remove assembly (2).

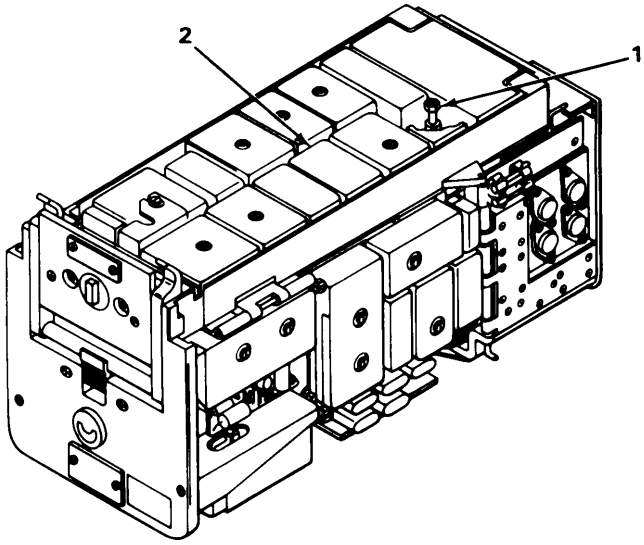
INSTALLATION

1. Position assembly (2) in hinge (8) and install hinge pin (7).
2. Install C-clip (6) on hinge pin (7).
3. Position P9501 (4) on J9501 (5) and push into place.
4. Using screwdriver, tighten two captive screws (3).
5. Close assembly (2) and install three shouldered screws (1).
6. Using screwdriver, tighten three shouldered screws (1).

FOLLOW-ON MAINTENANCE: Install case (para 2-39).

2-43. A3000 MODULES AND ASSEMBLY REPLACEMENT.

MATERIALS/PARTS: Amplifier, interfrequency A3400 (P/N SMB413634)
Crystal REF system assembly A3000 (P/N SMD619578)
Discriminator assembly, phase A3700 (P/N SMB413699)
Discriminator, elect. frequency A3600 (P/N SMB413670)
Filter, band-pass FL3003 (P/N SMD413524)
Filter, band-pass FL3004 and FL3005 (P/N SMD413523)
Filter, high-pass FL3002 (P/N SMD413521)
Filter, low-pass FL3001 (P/N SMD413522)
Generator assembly, harmonic A3100 (P/N SMB413559)
Limiter, amplifier A3500 (P/N SMB413650)
Mixer assembly, amplifier A3200 (P/N SMB413592)
Mixer assembly, second A3300 (P/N SMB413611)
PRELIMINARY PROCEDURE: Remove case (para 2-39).



EL1AT010

REMOVAL

NOTE

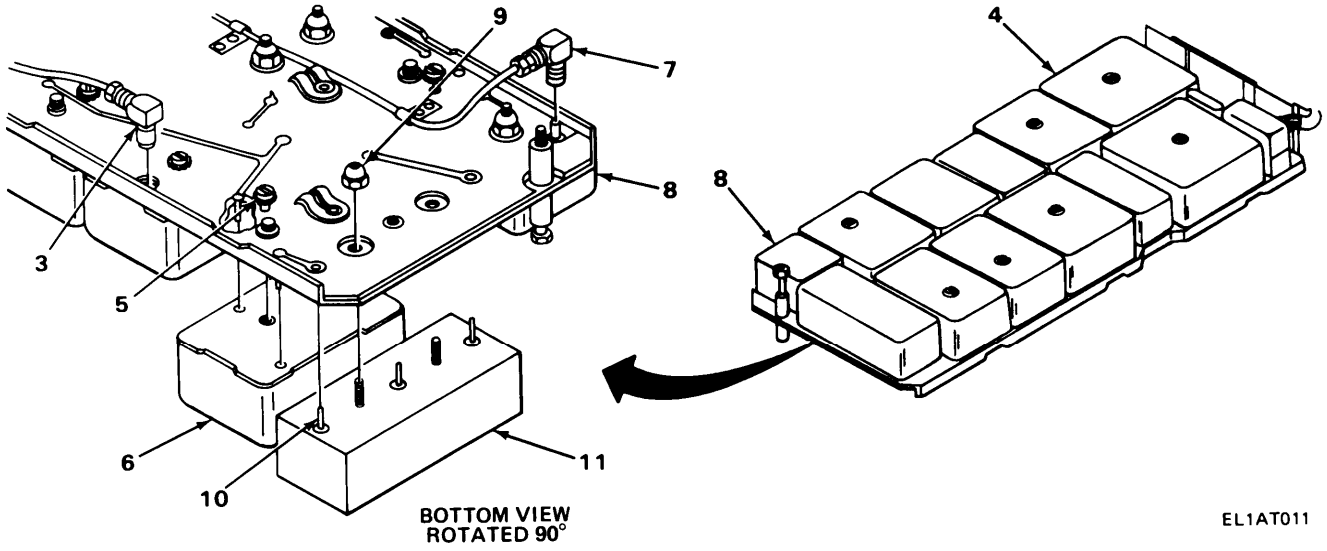
Position rt upside down on workbench.

1. Using screwdriver, loosen one captive screw (1).
2. Raise assembly (2).

NOTE

Assembly can be removed with or without first removing modules. If assembly is to be removed without removing modules, proceed to step 10.

2-43. A3000 MODULES AND ASSEMBLY REPLACEMENT. (CONT)



NOTE

Modules A3100 through A3700 are secured with captive screws. Steps 3, 4, and 5 are typical for all modules.

3. Disconnect black wire (P3301) (3) from A3300 and red wire (P3701) from A3700 (4).
4. Using screwdriver, loosen captive screws (5).

CAUTION

To prevent damaging pins, do not twist module from side to side.

5. Carefully pull module (6) off board to release from pins.

NOTE

Modules FL3001 through FL3005 are secured with locknuts and are soldered to printed circuit board. Steps 6 through 9 are typical for all modules.

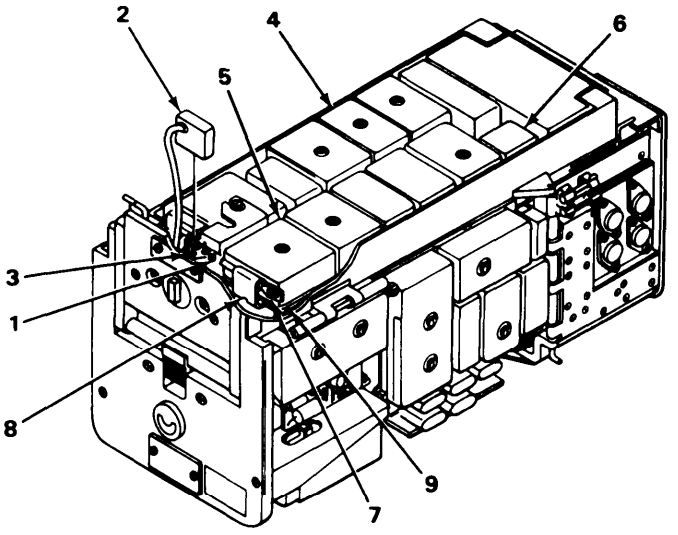
6. Disconnect green wire (P3002) (7) from FL3002 (8).
7. Using wrench, remove locknuts (9).

Care must be taken when performing next step to prevent damaging printed circuit board.

8. Using soldering iron, unsolder pins (10) from printed circuit board.
9. Carefully pull module (11) off board.

2-43. A3000 MODULES AND ASSEMBLY REPLACEMENT. (CONT)

REMOVAL (CONT)



EL1AT012

10. Using screwdriver, loosen two captive screws (1).
11. Carefully pull P3001 (2) off pins (3).

Wires referenced in step 12 are located under assembly.

12. Disconnect black wire (P3301) from A3300 (4), red wire (P3701) from A3700 (5), green wire (P3002) from FL3002 (6), and all wires from wire clips.
13. Remove hinge pin (7) from hinge (8).
14. Remove assembly (9).

INSTALLATION

CAUTION

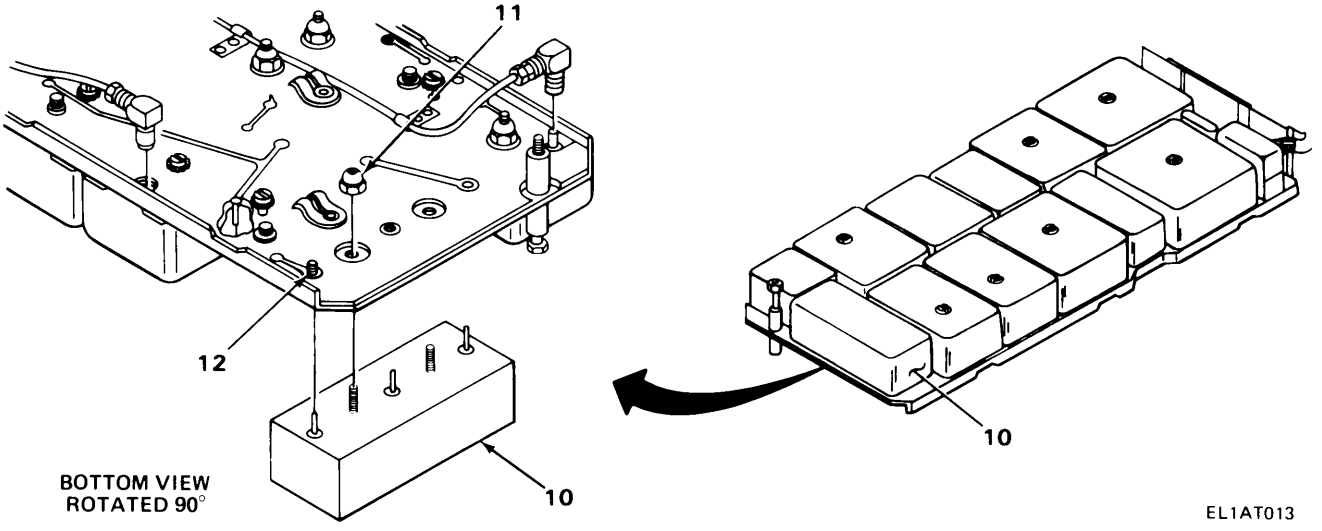
Before installing assembly, ensure pins are not bent. Straighten any bent pins. Extreme care must be taken not to damage pins.

1. Position assembly (9) in hinge (8) and install hinge pin (7).

NOTE

If modules were not removed from assembly, proceed to step 7 for installation of assembly.

2-43. A3000 MODULES AND ASSEMBLY REPLACEMENT. (CONT)



NOTE

Modules FL3001 through FL3005 are secured with locknuts and are soldered to printed circuit board. Steps 2, 3, and 4 are typical for all modules.

Module location is stamped on board.

2. Position module (10) on board and install locknuts (11).
3. Using wrench, tighten locknuts (11).

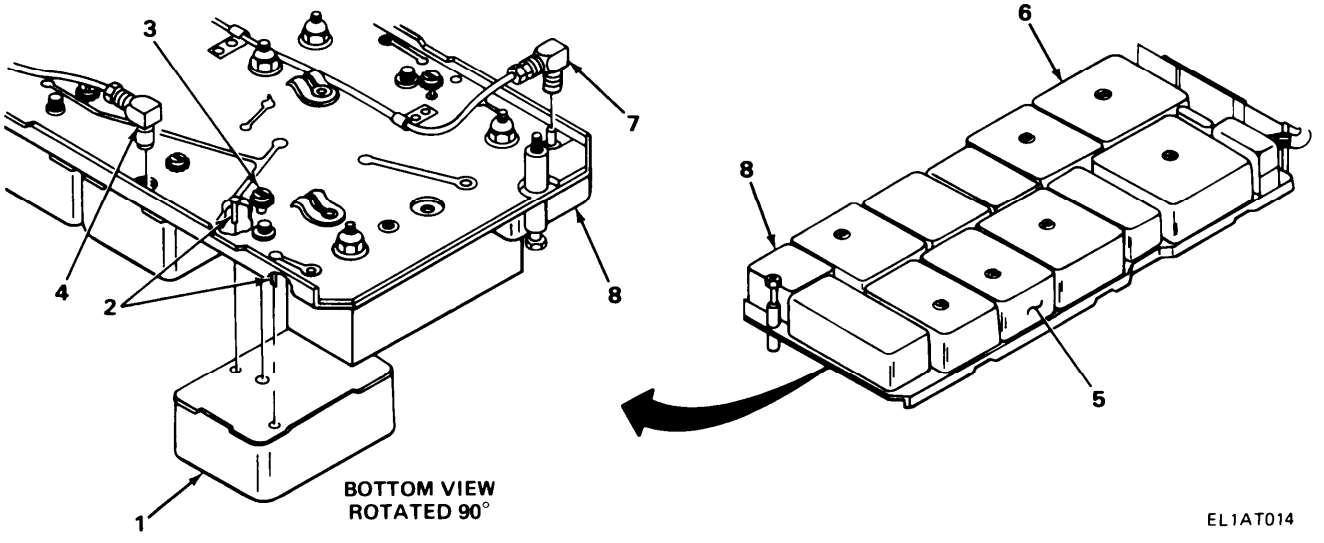
CAUTION

Care must be taken when performing next step to prevent damaging printed circuit board.

4. Using soldering iron, solder pins (12) of module to printed circuit board.

2-43. A3000 MODULES AND ASSEMBLY REPLACEMENT. (CONT)

INSTALLATION (CONT)



CAUTION

Before installing modules, ensure pins are not bent. Straighten any bent pins. Extreme care must be taken not to damage pins.

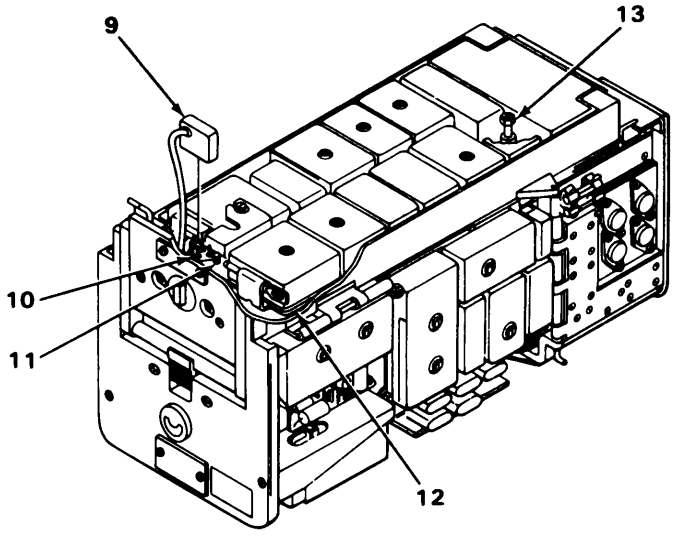
NOTE

Modules A3100 through A3700 are secured with captive screws. Steps 5 and 6 are typical for all modules.

Module location is stamped on board.

5. Carefully position module (1) on pins (2) and push into place.
6. Using screwdriver, tighten captive screws (3).
7. Connect black wire (P3301) (4) to A3300 (5), red wire (P3701) to A3700 (6), green wire (P3002) (7) to FL3002 (8), and all wires to wire clips.

2-43. A3000 MODULES AND ASSEMBLY REPLACEMENT. (CONT)



EL1AT015

CAUTION

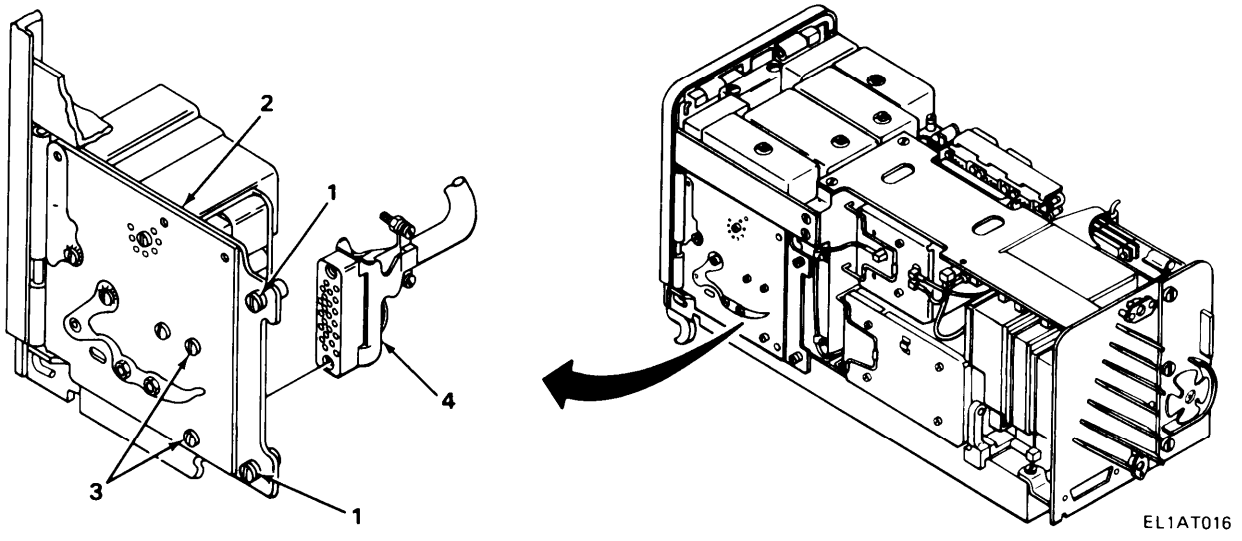
Extreme care must be taken when performing next step to prevent damaging pins on assembly.

8. Carefully position P3001 (9) on pins (10) and push into place.
9. Using screwdriver, tighten two captive screws (11).
10. Lower assembly (12) into chassis.
11. Using screwdriver, tighten one captive screw (13).

FOLLOW-ON MAINTENANCE: Install case (para 2-39).

2-44. A5500 MODULES AND ASSEMBLY REPLACEMENT.

MATERIALS/PARTS: Amplifier, assembly, radio frequency, A5500 (P/N SMD619527)
Amplifier, assembly, squelch, A5200 (P/N SMC413849)
Filter, assembly, squelch, A5300 (P/N SMB413660)
Filter, audiofrequency, FL5501 (P/N SMC413828)
Receiver, assembly, audio amplifier, A5400 (P/N 715980-801)
Relay, armature, K5501, K5503 through K5505 (P/N SMC413824)
Relay, armature, K5502 (P/N SMC413823)
PRELIMINARY PROCEDURE: Remove case (para 2-39).



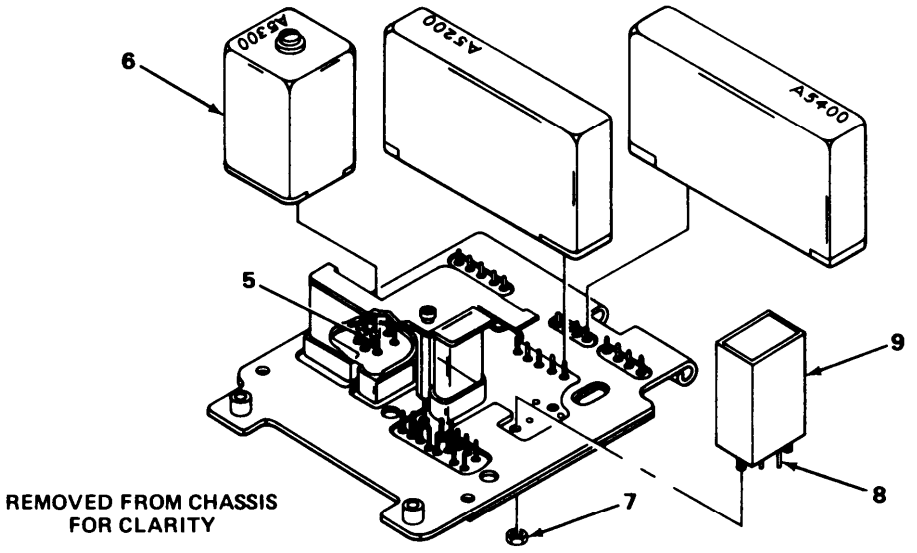
REMOVAL

1. Using screwdriver, loosen two captive screws (1) and swing out assembly (2).
2. Using screwdriver, loosen two captive screws (3) and remove P5501 (4).

NOTE

Assembly can be removed with or without first removing modules. If assembly is to be removed without removing modules, proceed to step 10.

2-44. A5500 MODULES AND ASSEMBLY REPLACE. (CONT)



NOTE

Modules A5200 through A5400 are secured with captive screws. Steps 3 and 4 are typical for all modules.

3. Using screwdriver, loosen captive screws (5).

CAUTION

To prevent damaging pins, do not twist module from side to side.

4. Carefully pull module (6) off board to release from pins.

NOTE

Filter module FL5001 is secured with locknuts and is solder to printed circuit board.

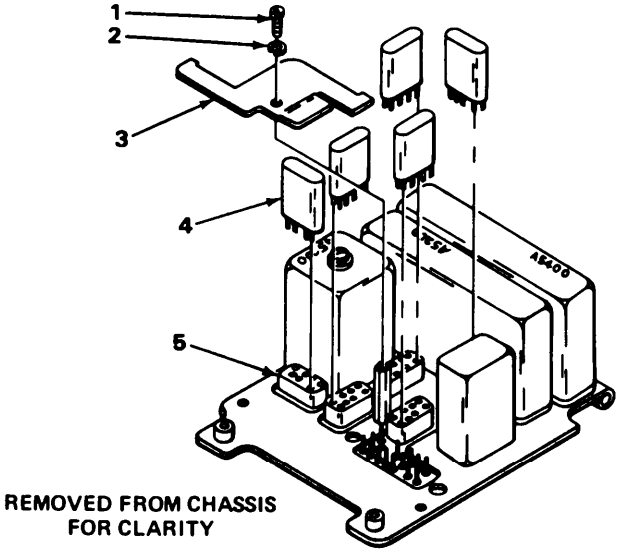
5. Using wrench, remove locknuts (7).

CAUTION

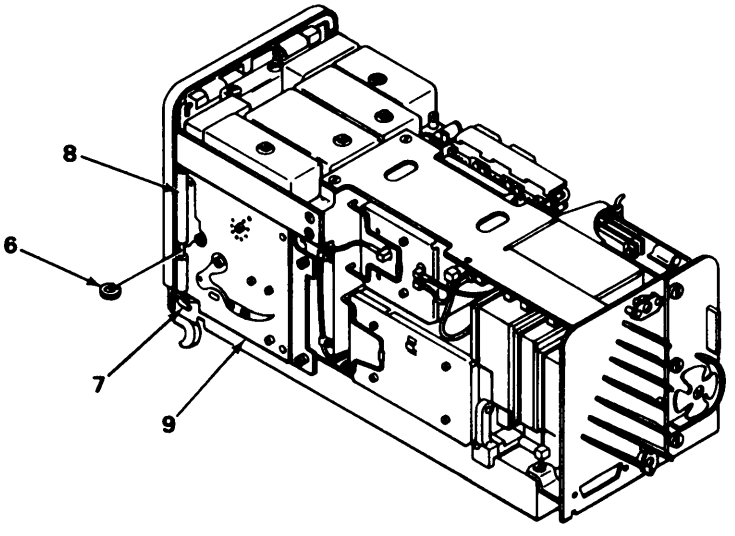
Care must be taken when performing next step to prevent damaging printed circuit board.

6. Using soldering iron, unsolder pins (8) of module (9) from printed circuit board.
7. Carefully pull module (9) off board.

2-44. A5500 MODULES AND ASSEMBLY REPLACEMENT. (CONT)



EL1AT018



EL1AT019

NOTE

Relays K5501 through K5505 are held into sockets by a holddown clamp. Steps 8 and 9 are typical for all relays.

8. Using screwdriver, remove screw (1), lockwasher (2), and holddown clamp (3).
9. Pull relay (4) out of socket (5).
10. Remove C-clip (6) from hinge pin (7).
11. Remove hinge pin (7) from hinge (8).
12. Remove assembly (9).

2-44. A5500 MODULES AND ASSEMBLY REPLACEMENT. (CONT)

INSTALLATION

1. Position assembly (9) in hinge (8).
2. Install hinge pin (7) in hinge (8) from bottom.
3. Install C-clip (6) in hinge pin (7).

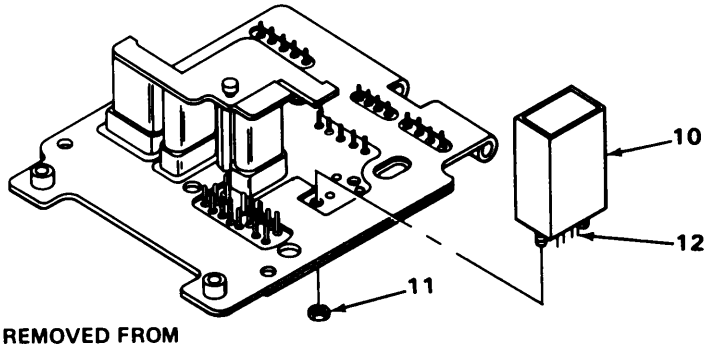
NOTE

If modules were not removed from assembly, proceed to step 12 for installation of assembly.

Relays K5501 through K5505 are held into sockets by a holddown clamp. Steps 4, 5, and 6 are typical for all relays.

Relay K5502 is P/N SMC413823 while all other relays are P/N SMC413824.

4. Aline pins on relay (4) with holes in socket (5) and push into place.
5. Position holddown clamp (3) over relays and install screw (1) and lockwasher (2).
6. Using screwdriver, tighten screw (1).



EL1AT020

NOTE

Filter module is secured with locknuts and is soldered to printed circuit board.

7. Position module (10) on board and install locknuts (11).
8. Using wrench, tighten locknuts (11).

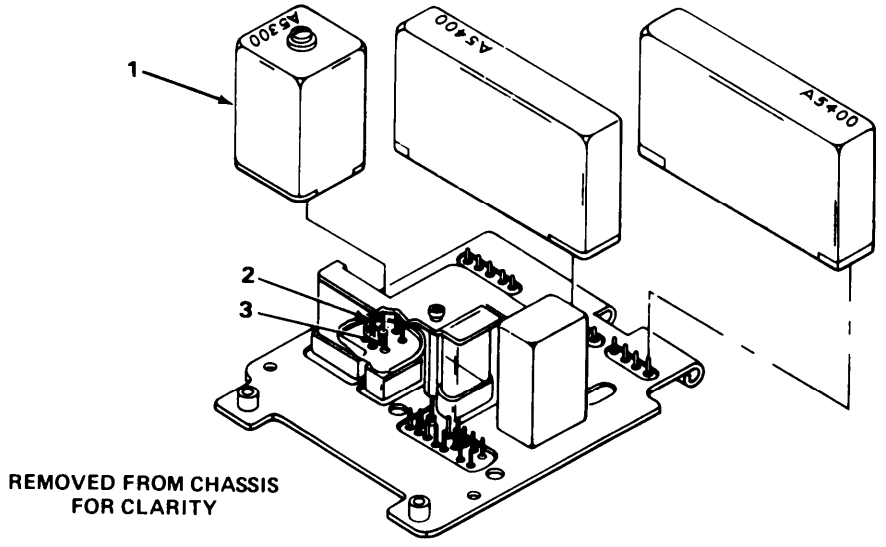
CAUTION

Care must be taken when performing next step to prevent damaging printed circuit board.

9. Using soldering iron, solder pins (12) on module (10) to printed circuit board.

2-44. A5500 MODULES AND ASSEMBLY REPLACEMENT. (CONT)

INSTALLATION (CONT)



EL1AT021

CAUTION

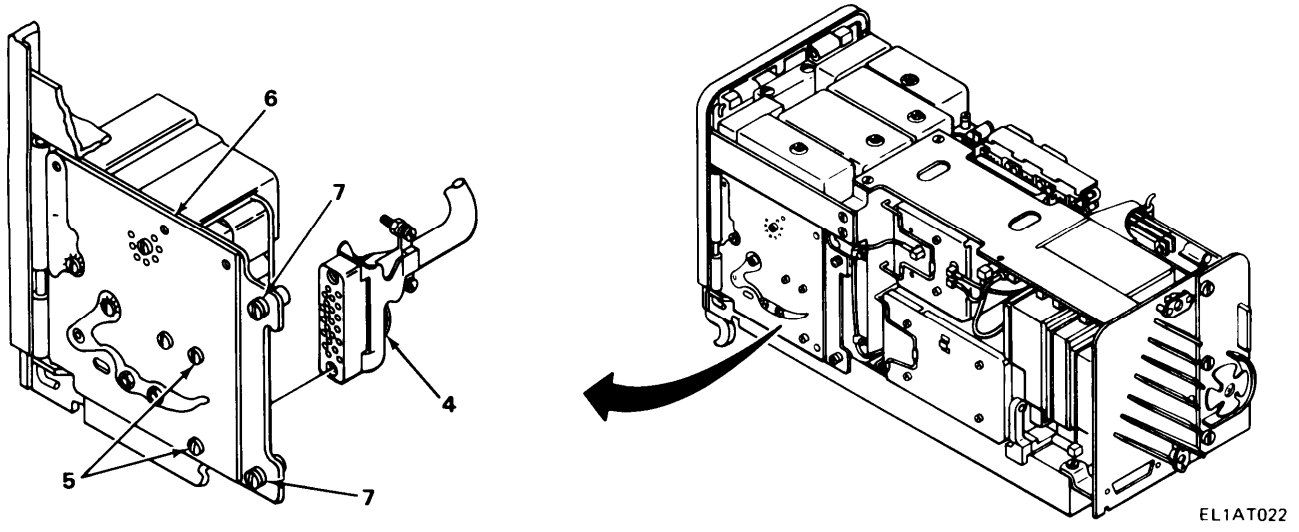
Before installing modules, ensure pins on assembly are not bent. Straighten any bent pins. Extreme care must be taken not to damage pins.

NOTE

Modules A5200 through A5400 are secured with captive screws. Steps 10 and 11 are typical for all modules.

10. Carefully position module (1) on pins (2) and push into place.
11. Using screwdriver, tighten captive screws (3).

2-44. A5500 MODULES AND ASSEMBLY REPLACEMENT. (CONT)

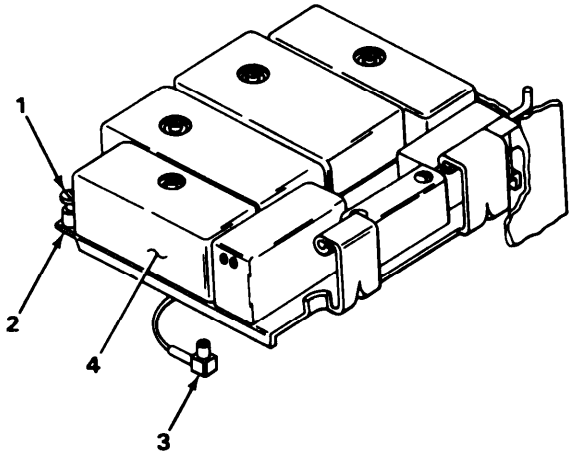


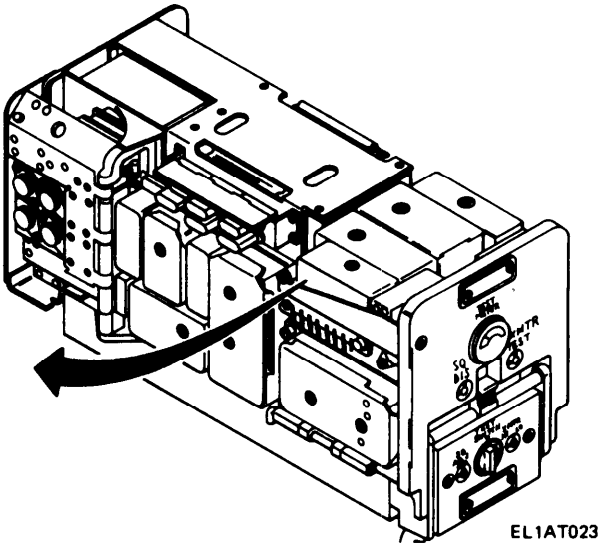
12. Position P5501 (4) on pins and push into place.
13. Using screwdriver, tighten two captive screws (5).
14. Swing assembly (6) to closed position.
15. Using screwdriver, tighten two captive screws (7).

FOLLOW-ON MAINTENANCE: Install case (para 2-39).

2-45. A8700 MODULES AND ASSEMBLY REPLACEMENT.

MATERIALS/PARTS: Amplifier, intermediate frequency, A8300 (P/N SMB414197)
Amplifier modulator assembly, A8700 (P/N SMC819555)
Filter, low-pass (P/N SM-C414172)
Frequency generator, A8400 (P/N SMB374983)
Mixer, audiofrequency, A8800 (P/N SM-C819588)
Modulator assembly, A8100 (P/N SMD414176)
Phase discriminator assembly, A8200 (P/N SMB414215)
PRELIMINARY PROCEDURE: Remove case (para 2-39).





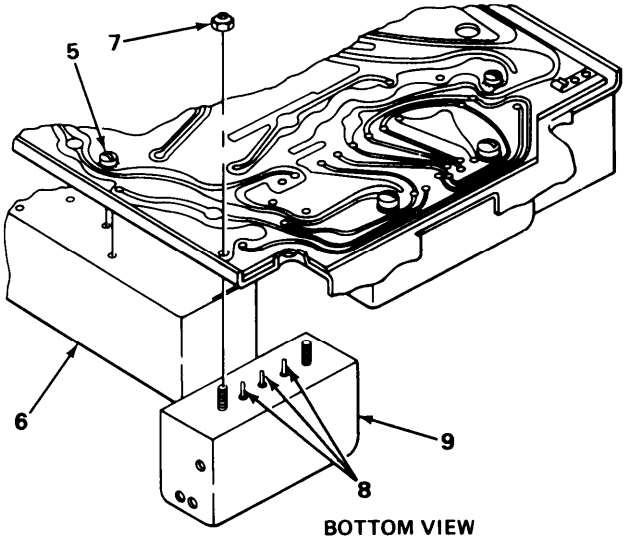
REMOVAL

1. Using screwdriver, loosen two captive screws (1) and raise assembly (2).
2. Disconnect violet wire connector (3) from A8300 assembly (4).

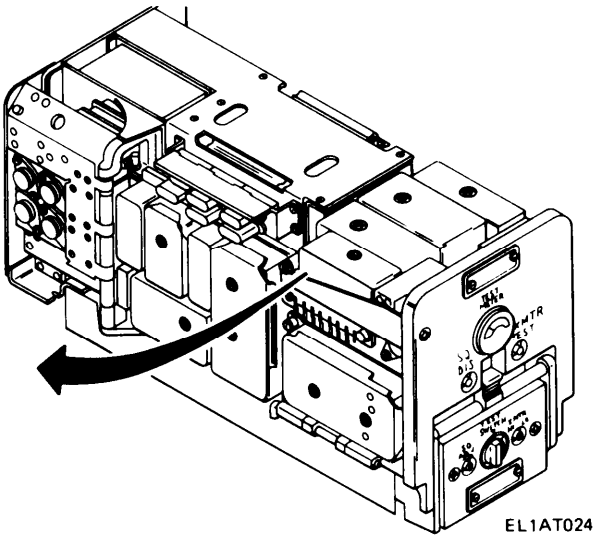
NOTE

Assembly can be removed with or without first removing modules. If assembly is to be removed without removing modules, proceed to step 8.

2-45. A8700 MODULES AND ASSEMBLY REPLACEMENT. (CONT)



BOTTOM VIEW


EL1AT024

NOTE

Modules A8100 through A8400 and A8600 are secured with captive screws. Steps 3 and 4 are typical for all modules.

3. Using screwdriver, loosen captive screws (5).

CAUTION

To prevent damage to pins, do not twist module from side to side.

4. Carefully pull module (6) off board to release from pins.

NOTE

Filter module is secured with locknuts and is soldered to printed circuit board.

5. Using wrench, remove locknuts (7).

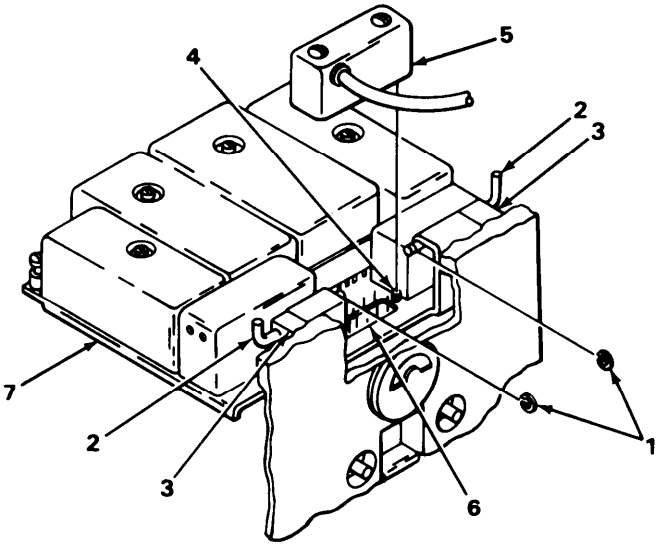
CAUTION

Care must be taken when performing next step to prevent damaging printed circuit board.

6. Using soldering iron, unsolder pins (8) of module (9) from printed circuit board.
7. Carefully pull module (9) off board.

2-45. A8700 MODULES AND ASSEMBLY REPLACEMENT. (CONT)

REMOVAL (CONT)



EL1AT025

8. Remove two C-clips (1) from hinge pins (2).
9. Remove two hinge pins (2) from hinges (3).
10. Using screwdriver, loosen two captive screws (4).
11. Carefully lift P8701 (5) off pins (6).
12. Remove assembly (7).

INSTALLATION

CAUTION

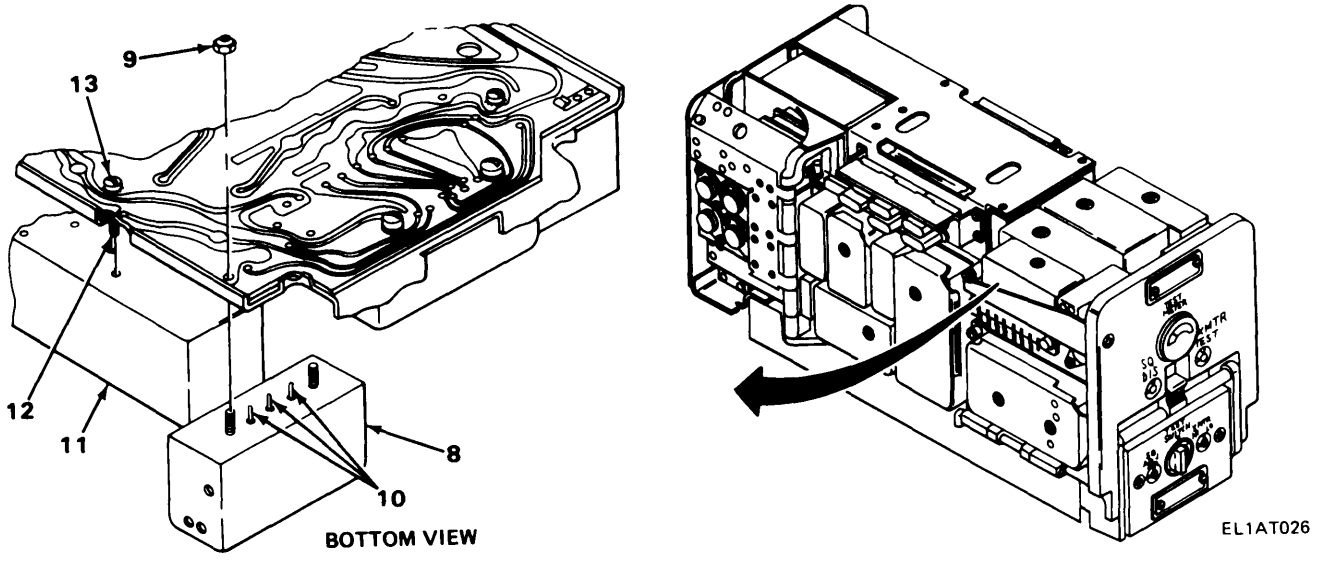
Before installing assembly, ensure pins (6) are not bent. Straighten any bent pins. Extreme care must be taken not to damage pins.

1. Position P8701 (5) on pins (6) and push into place.
2. Using screwdriver, tighten two captive screws (4).
3. Position assembly (7) in hinges (3).
4. Install two hinge pins (2) in hinges (3).
5. Install two C-clips (1) on hinge pins (2).

NOTE

If modules were not removed from assembly, proceed to step 11 for installation of assembly.

2-45. A8700 MODULES AND ASSEMBLY REPLACEMENT. (CONT)



NOTE

Filter module is secured with locknuts and is soldered to printed circuit board.

Module location is stamped on board.

6. Position module (8) on board and install locknuts (9).
7. Using wrench, tighten locknuts (9).

CAUTION

Care must be taken when performing next step to prevent damaging printed circuit board.

8. Using soldering iron, solder pins (10) of module (8) to printed circuit board.

CAUTION

Before installing modules, ensure pins on assembly are not bent. Straighten any bent pins. Extreme care must be taken not to damage pins.

NOTE

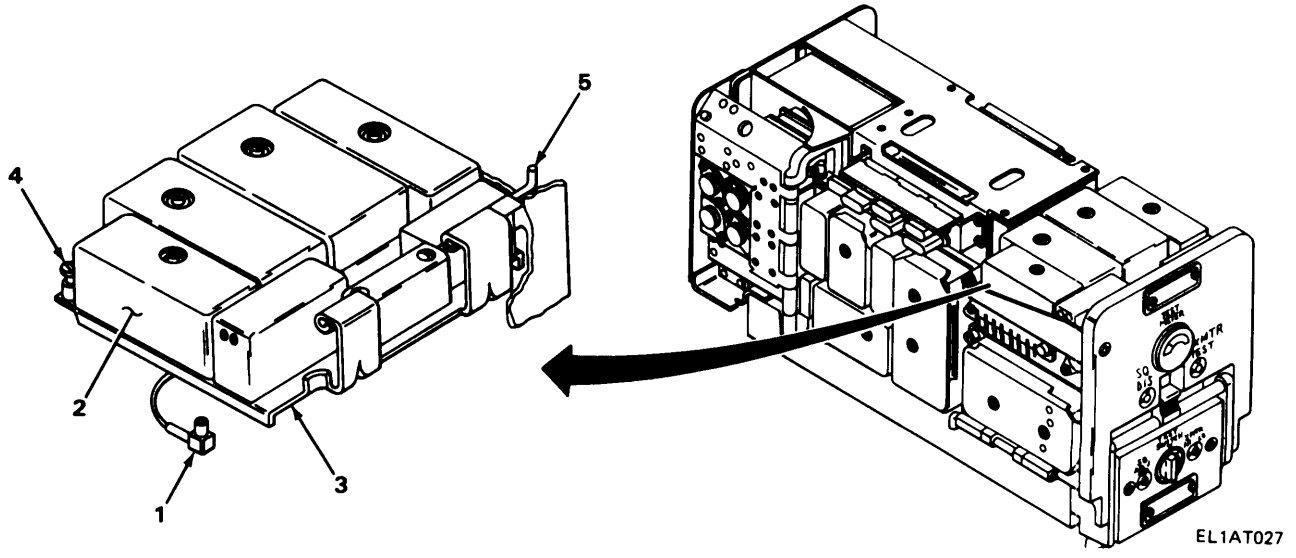
Modules A8100 through A8400 and A8600 are secured with captive screws. Steps 9 and 10 are typical for all modules.

Module location is stamped on board.

9. Carefully position module (11) on pins (12) and push into place.
10. Using screwdriver, tighten captive screws (13).

2-45. A8700 MODULES AND ASSEMBLY REPLACEMENT. (CONT)

INSTALLATION (CONT)



11. Connect violet wire connector (1) to A8300 assembly (2).
12. Lower assembly (3) into chassis.
13. Using screwdriver, tighten two captive screws (4).

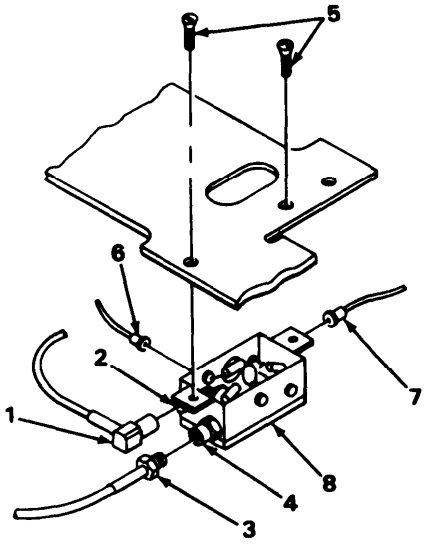
NOTE

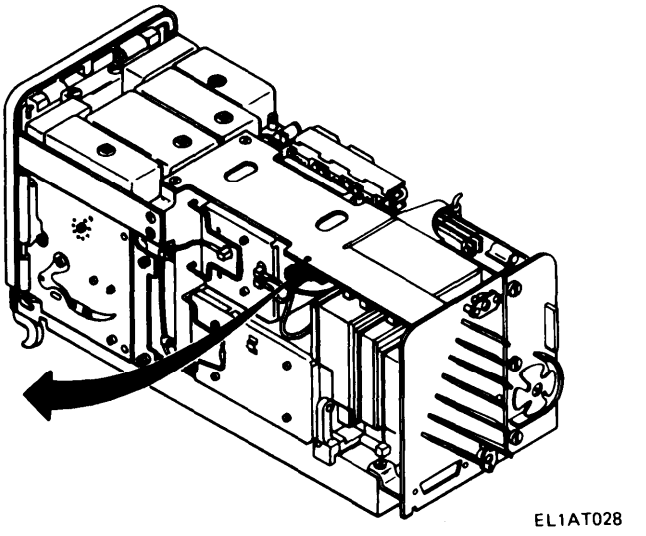
Ensure handles on hinge pins (5) are down in a horizontal position so case can be installed.

FOLLOW-ON MAINTENANCE: Install case (para 2-39).

2-46. A6600 ASSEMBLY REPLACEMENT.

MATERIALS/PARTS: Amplifier assembly, isolation, A6000 (P/N SMD619913)
PRELIMINARY PROCEDURE: Remove case (para 2-39).





REMOVAL

1. Disconnect yellow wire (P6601) (1) from J6601 (2).
2. Using two wrenches, disconnect yellow wire (P6003) (3) from screw connector (4).
3. Using screwdriver, remove two screws (5).
4. Disconnect black wire connector (6) from color-coded plug.
5. Disconnect orange wire connector (7) from color-coded plug.
6. Remove A6600 assembly (8).

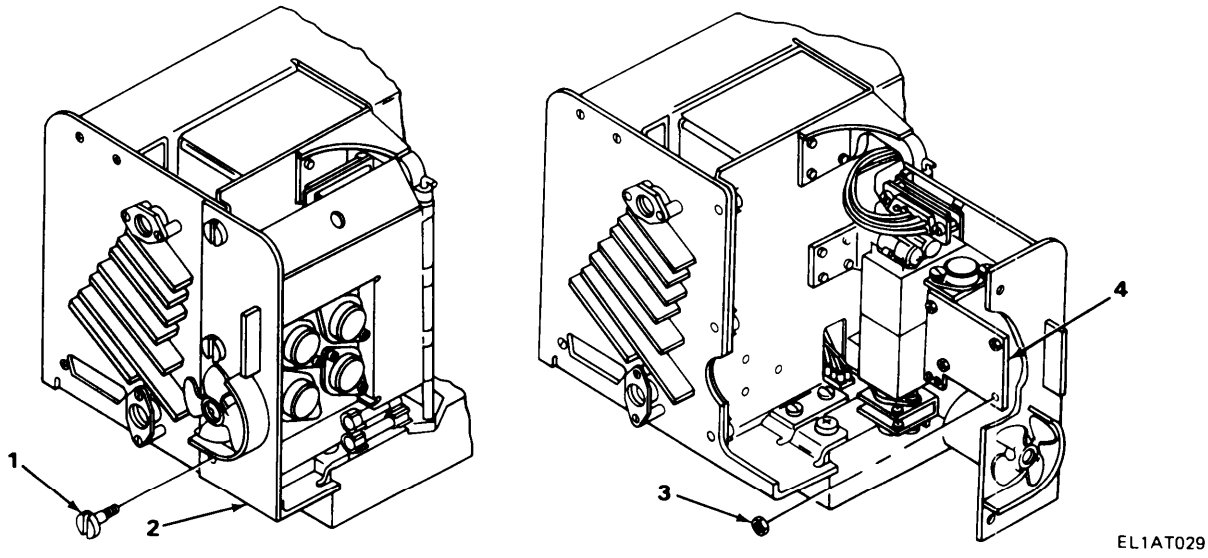
INSTALLATION

1. Connect orange wire connector (7) to color-coded plug.
2. Connect black wire connector (6) to color-coded plug.
3. Position A6600 assembly (8) under bracket and install two screws (5).
4. Using screwdriver, tighten two screws (5).
5. Connect yellow wire (P6003) (3) to screw connector (4).
6. Using two wrenches, tighten yellow wire (P6003) (3) and connector (4).
7. Connect yellow wire (P6601) (1) to J6601 (2).

FOLLOW-ON MAINTENANCE: Install case (para 2-39).

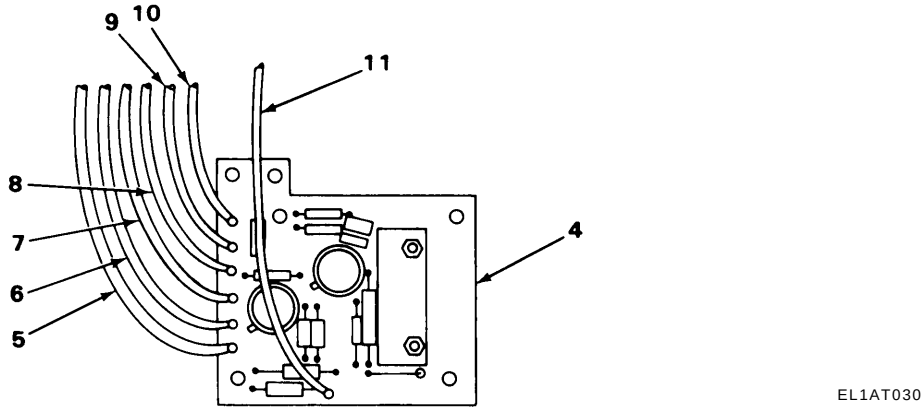
2-47. POWER SUPPLY CIRCUIT CARD REPLACEMENT.

MATERIALS/PARTS: Circuit card assembly (P/N SMD619800)
PRELIMINARY PROCEDURE: Remove case (para 2-39).



REMOVAL

1. Using screwdriver, remove three shouldered screws (1) and swing open assembly (2).
2. Using wrench, remove four locknuts (3) and remove circuit card (4) from studs.
3. Turn circuit card (4) to gain access to wires on rear.



2-47. POWER SUPPLY CIRCUIT CARD REPLACEMENT. (CONT)

4. Using soldering iron, unsolder wires as shown in circuit card wiring table below.

CIRCUIT CARD WIRING TABLE

WIRE COLOR	INDEX NO.
WHT/ORG	5
WHT/RED	6
BLK	7
WHT/BLU	8
WHT	9
RED	10
WHT/GRN	11

5. Remove circuit card (4).

INSTALLATION

CAUTION

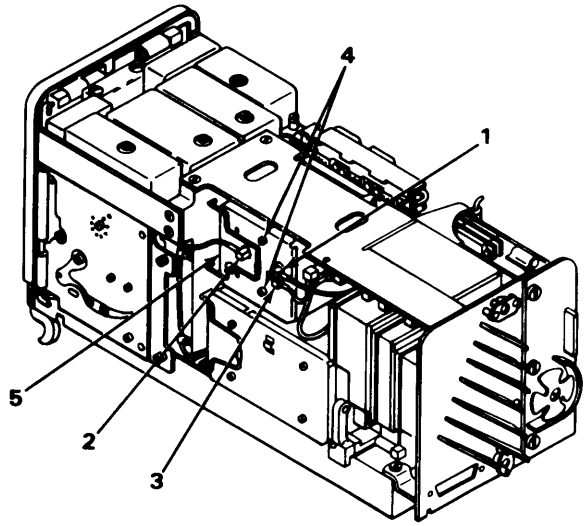
Care must be taken when performing next step to prevent damaging printed circuit board.

1. Using soldering iron, solder wires as shown in circuit card wiring table above.
2. Position circuit card (4) on studs and install four locknuts (3).
3. Using wrench, tighten four locknuts (3).
4. Close assembly (2) and install three shouldered screws (1).
5. Using screwdriver, tighten three shouldered screws (1).

FOLLOW-ON MAINTENANCE: Install case (para 2-39).

2-48. A6300 AND A6400 MODULE REPLACEMENT.

MATERIALS/PARTS: Circuit card assembly, A6300 (P/N SMD374993)
Circuit card assembly, A6400 (P/N SMD374996)
PRELIMINARY PROCEDURE: Remove case (para 2-39).



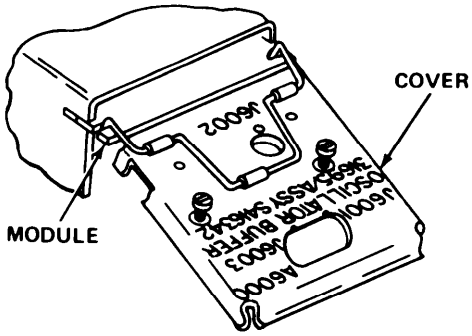
EL1AT031

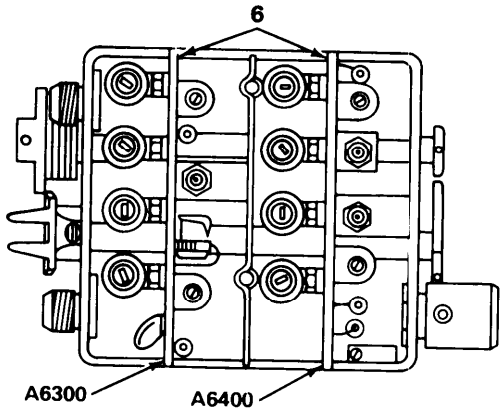
NOTE

Modules A6300 and A6400 are housed within the A6000 assembly.

REMOVAL

1. Disconnect gray wire (1) from J6001, brown wire (2) from J6002, and yellow wire (3) from J6003.
2. Using screwdriver, loosen two captive screws (4) and remove A6000 assembly cover (5).





EL1AT032

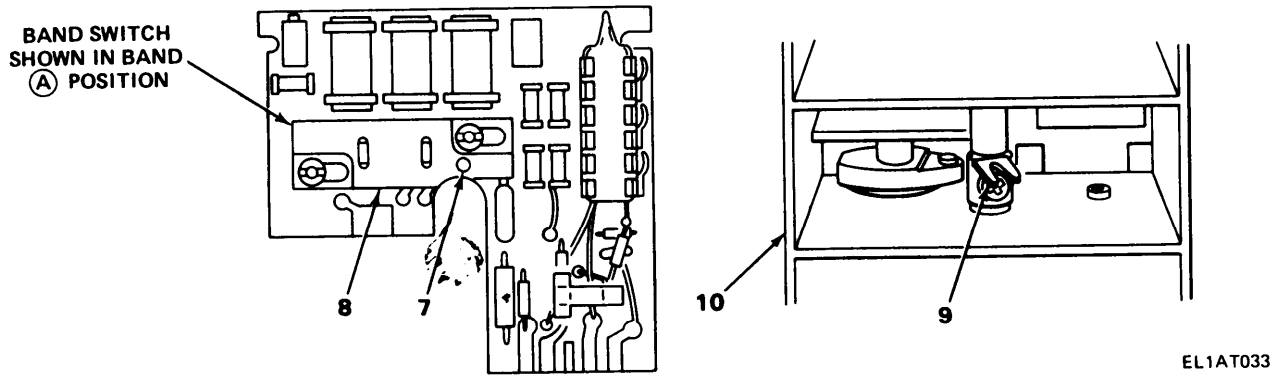
NOTE

A6000 assembly cover doubles as module puller to remove both modules.

3. Using module puller, carefully remove modules (6).

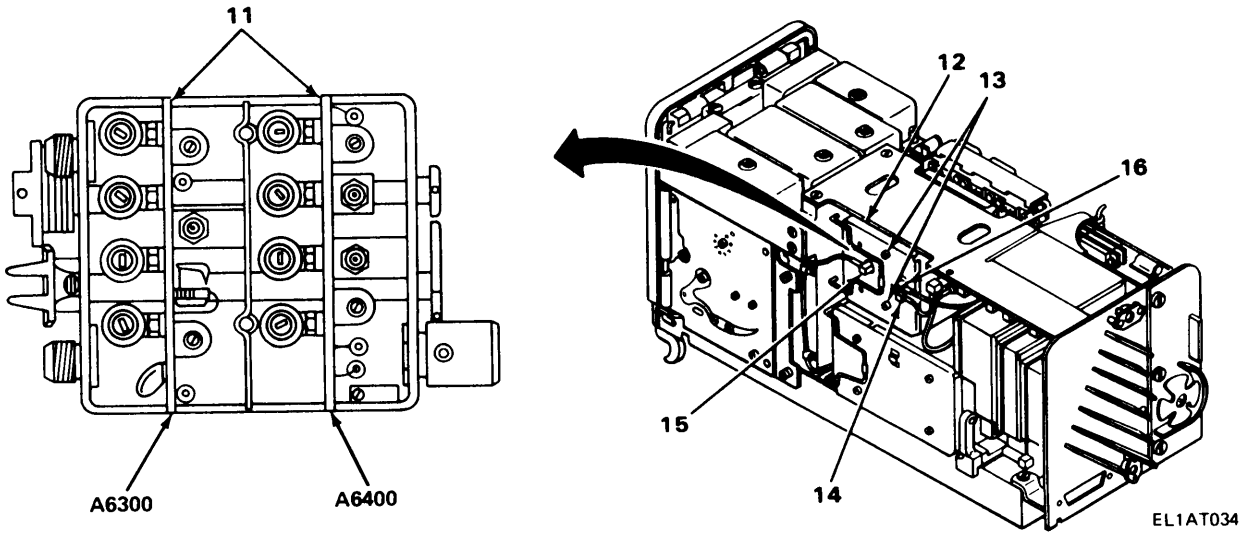
2-48. A6300 AND A64Q0 MODULE REPLACEMENT. (CONT)

INSTALLATION



CAUTION

Before installing modules A1100 through A1300, ensure band switch pin (7) on module (8) is positioned to mate with band switch actuating pawl (9) on A8000 assembly (10).



1. Carefully push modules (11) into place.

NOTE

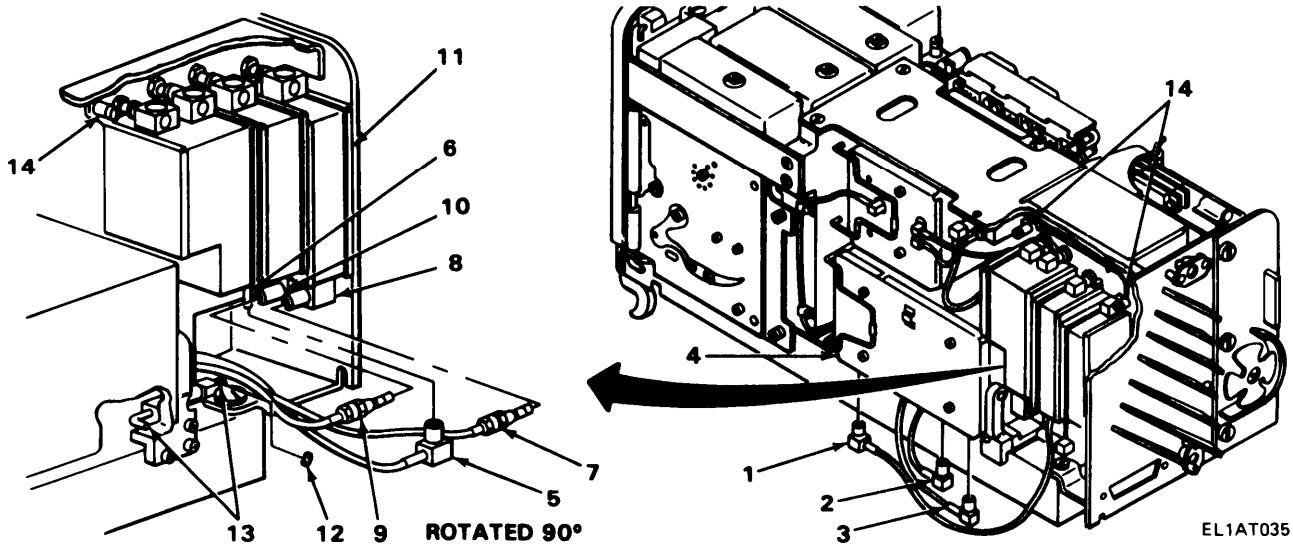
Ensure spring contacts on modules make contact with partitions between modules.

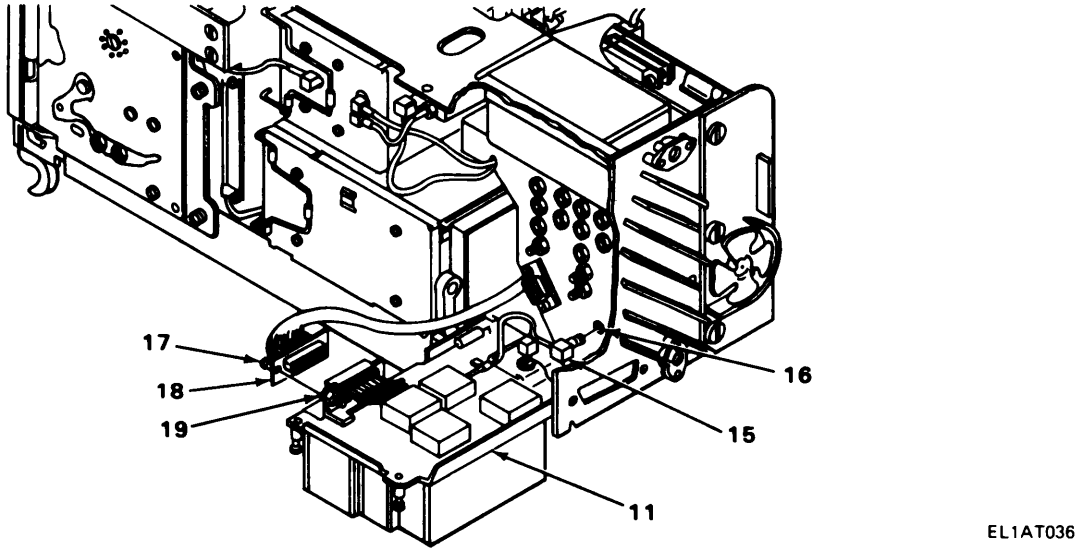
2. Install A8000 assembly cover (12) on A6000 assembly.
3. Using screwdriver, tighten two captive screws (13).
4. Connect yellow wire (14) to J6003, brown wire (15) to J6002, and gray wire (16) to J6001.

FOLLOW-ON MAINTENANCE: Install case (para 2-39).

2-49. A4500 ASSEMBLY REPLACEMENT.

MATERIALS/PARTS: Control, radio frequency, A4500 (P/N SMC619709)
PRELIMINARY PROCEDURE: Remove case (para 2-39).





2-49. A4500 ASSEMBLY REPLACEMENT. (CONT)

REMOVAL

1. Disconnect white wire (P1001) (1) from J1001, violet wire (P1003) (2) from J1003, and green wire (P1004) (3) from J1004 on A1000 assembly (4).
2. Disconnect orange wire (P4505) (5) from J4505 (6), violet wire (P4503) (7) from J4503 (8), and brown wire (9) from J4502 (10), on A4500 assembly (11).
3. Remove C-clip (12) from hinge pin (13).
4. Using screwdriver, loosen two captive screws (14) and lower A4500 assembly (11).

NOTE

When performing next step, slide hinge pin back only enough to allow removal of A4500 assembly from hinge.

5. Slide hinge pin back and remove A4500 assembly from hinge.

NOTE

Push hinge pin back into position to prevent it from falling out.

6. Disconnect white wire (P6502) (15) from J6502 (16).
7. Using screwdriver, loosen two captive screws (17) and unplug P4501 (18) from J4501 (19).
8. Remove A4500 assembly (11).

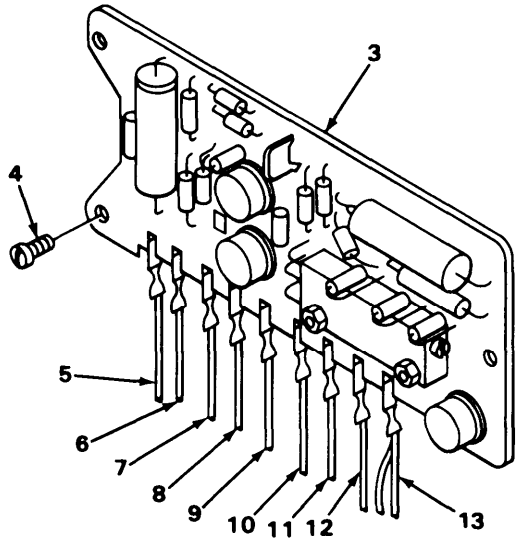
INSTALLATION

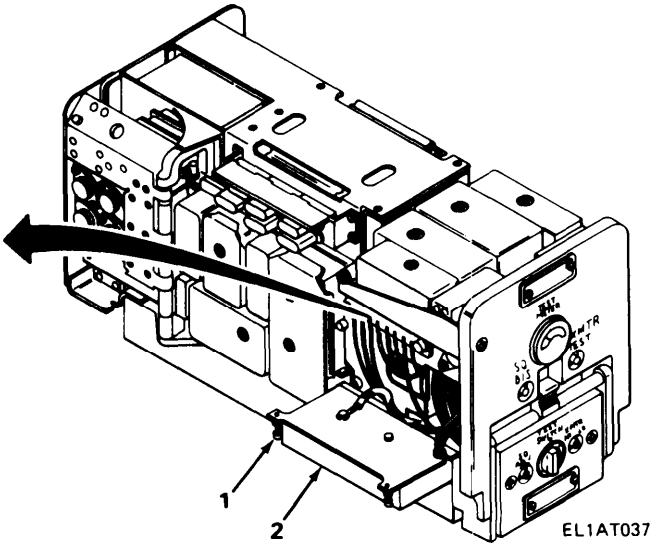
1. Position A4500 assembly (11) near hinge and plug P4501 (18) into J4501 (19).
2. Using screwdriver, tighten two captive screws (17).
3. Connect white wire (P6502) (15) to J6502 (16).
4. Slide hinge pin (13) back just enough to allow installation of A4500 assembly (11).
5. Install A4500 assembly (11) in hinge and slide hinge pin (13) into place.
6. Install C-clip (12) and raise A4500 assembly (11) into position.
7. Using screwdriver, tighten two captive screws (14).
8. Connect brown wire (9) to J4502 (10), violet wire (P4503) (7) to J4503 (8), and orange wire (P4505) (5) to J4505 (6) on A4500 assembly.
9. Connect green wire (P1004) (3) to J1004, violet wire (P1003) (2) to J1003, and white wire (P1001) (1) to J1001 on A1000 assembly (4).

FOLLOW-ON MAINTENANCE: Install case (para 2-39).

2-50. A2100 ASSEMBLY REPLACEMENT.

MATERIALS/PARTS: Regulator assembly, voltage, A2100 (P/N SMD41457)
PRELIMINARY PROCEDURE: Remove case (para 2-39).





REMOVAL

1. Using screwdriver, loosen two captive screws (1) and lower A4600 assembly (2).
2. Disconnect nine wire connectors from A2100 assembly (3).
3. Using screwdriver, remove three screws (4) and remove A2100 assembly (3).

INSTALLATION

1. Position A2100 assembly (3) on chassis and install three screws (4).
2. Using screwdriver, tighten three screws (4).
3. Connect nine wire connectors as shown in table below.

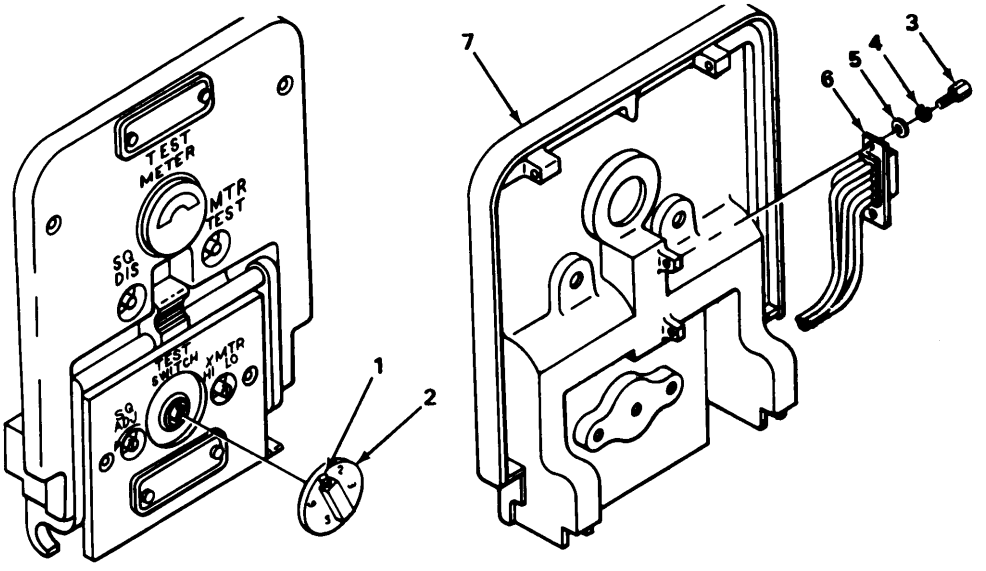
POSITION ON ASSEMBLY	WIRE COLOR	INDEX NO.	POSITION ON ASSEMBLY	WIRE COLOR	INDEX NO.
1	GRN	5	6	ORG	10
2	WHT/BLU	6	7	WHIT/VIO	11
3	WHT/GRN	7	8	WHT/GRY	12
4	WHT/RED	8	9	BLK & BLK	13
5	YEL	9		(2 wires)	

4. Raise A6400 assembly (2) into position.
5. Using screwdriver, tighten two captive screws (1).

FOLLOW-ON MAINTENANCE: Install case (para 2-39).

2-51. FRONT PANEL REPLACEMENT.

MATERIALS/PARTS: Panel, front
PRELIMINARY PROCEDURE: Remove TEST METER, M9601 (para 2-53).
Remove SQ DIS switch S9602 and XMTR TEST switch S9603 (para 2-54).



REMOVAL

1. Using hex wrench, loosen setscrew (1) and remove TEST SWITCH knob (2).
2. Using wrench, remove two screw fasteners (3), Iockwashers (4), and flat washers (5), and move J4801 (6) out of way.
3. Remove front panel (7).

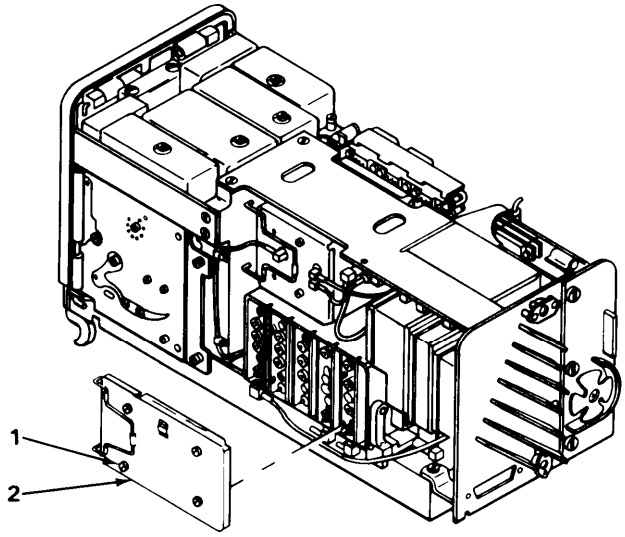
INSTALLATION

1. Position front panel (7) near chassis.
2. Position J4801 (6) on standoffs and install two screw fasteners (3), Iockwashers (4), and flat washers (5).
3. Using wrench, tighten two screw fasteners (3).
4. Install TEST SWITCH knob (2) and, using hex wrench, tighten setscrew (1).

FOLLOW-ON MAINTENANCE: Install SQ DIS switch, S9602 and XMTR TEST switch, S9603 (para 2-54). Install TEST METER, M9601 (para 2-53).

2-52. A1100 THROUGH A1500 MODULE REPLACEMENT.

MATERIALS/PARTS: Circuit card assembly, A1100 (P/N SMD 374983)
Circuit card assembly, A1200 (P/N SMD 416370)
Circuit card assembly, A1300 (P/N SMD 374990)
Circuit card assembly, A1400 (P/N SMD 374986)
Circuit card assembly, A1500 (P/N SMD 416384)
PRELIMINARY PROCEDURE: Remove case (para 2-39).



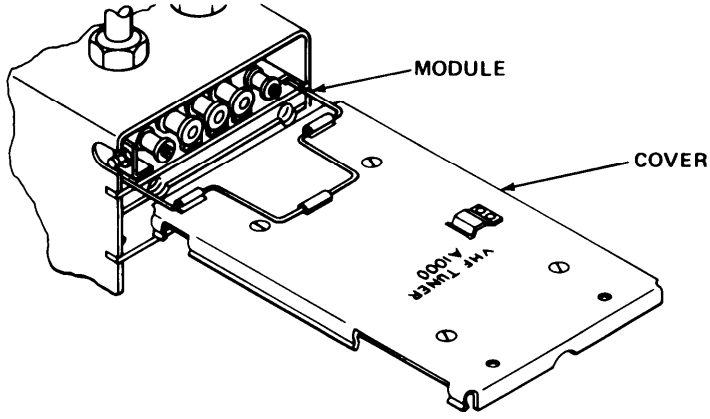
EL1AT038

REMOVAL

NOTE

Modules A1100 through A1500 are housed within the A1000 assembly.

1. Using screwdriver, loosen four captive screws (1) and remove A1000 assembly cover (2).

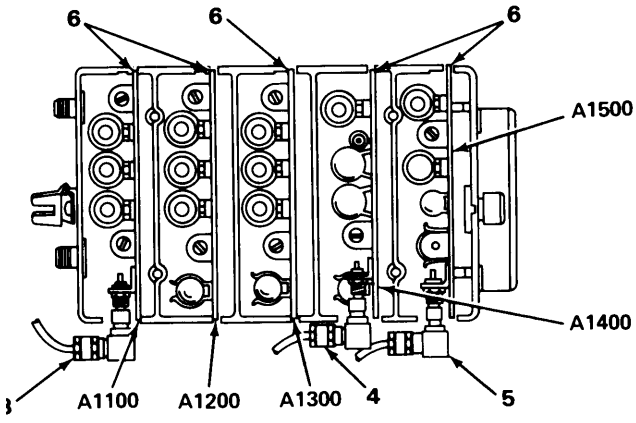


EL1AT039

2-52. A1100 THROUGH A1500 MODULE REPLACEMENT. (CONT)

NOTE

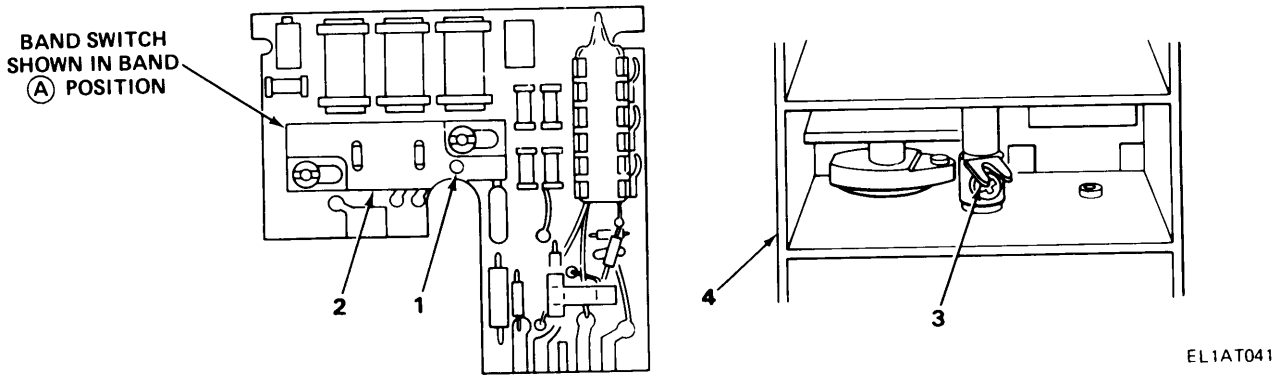
A 1000 assembly cover is also used as a module puller to remove all modules.



EL1AT040

2. Before removing A1100 module, disconnect white wire (3) from J1001; before removing A1400 module, disconnect violet wire (4) from J1003; before removing A1500 module, disconnect green wire (5) from J1004.
3. Using module puller, carefully remove modules (6).

INSTALLATION



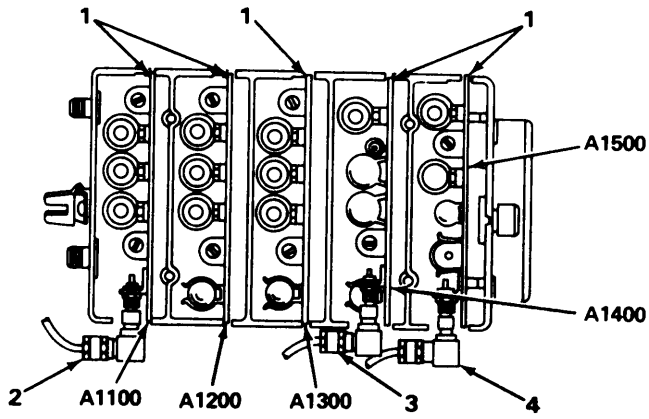
EL1AT041

CAUTION

Before installing modules A1100 through A1300, ensure band switch pin (1) on module (2) is positioned to mate with band switch actuating pawl (3) on A1000 assembly (4).

2-52. A1100 THROUGH A1500 MODULE REPLACEMENT. (CONT)

INSTALLATION - CONTINUED



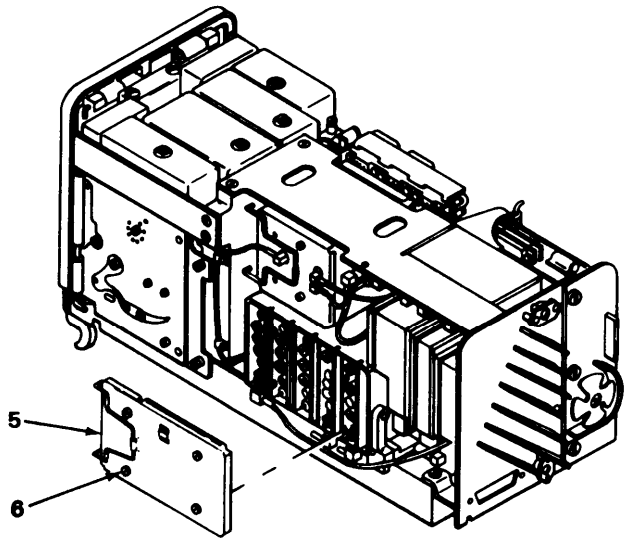
EL1AT042

1. Carefully push

NOTE

Ensure spring contacts on modules make contact with partitions between modules.

2. If modules A1100, A1400, or A1500 were removed, reconnect white wire (2) to J1001, violet wire (3) to J1003, or green wire (4) to J1004.



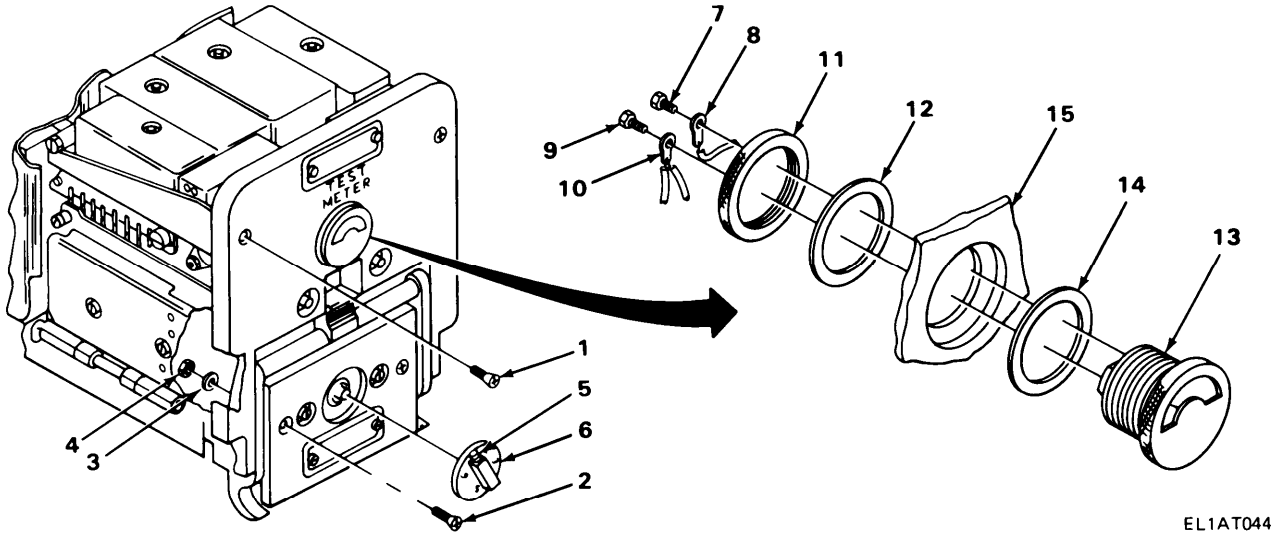
EL1AT043

3. Install A1000 assembly cover (5) on A1000 assembly.
4. Using screwdriver, tighten four captive screws (6).

FOLLOW-ON MAINTENANCE: Install case (para 2-39).

2-53. TEST METER M9601 REPLACEMENT.

MATERIALS/PARTS: Meter, electrical indicating, dc, M9601 (P/N MS90212-24)
PRELIMINARY PROCEDURE: Remove A8700 assembly (para 2-45).



REMOVAL

1. Using screwdriver, remove two screws (1).
2. Using screwdriver and wrench, remove two screws (2), flat washers (3), and nuts (4).
3. Using hex wrench, loosen setscrew (5) and remove TEST SWITCH knob (6).

NOTE

Pull front panel away from chassis slightly to gain access to rear.

4. Using wrench, remove screw (7) and white wire lug (8), and screw (9) and black wire lug (10).
5. Remove knurled nut (11) and gasket (12), and push meter (13) and gasket (14) out of front panel (15).

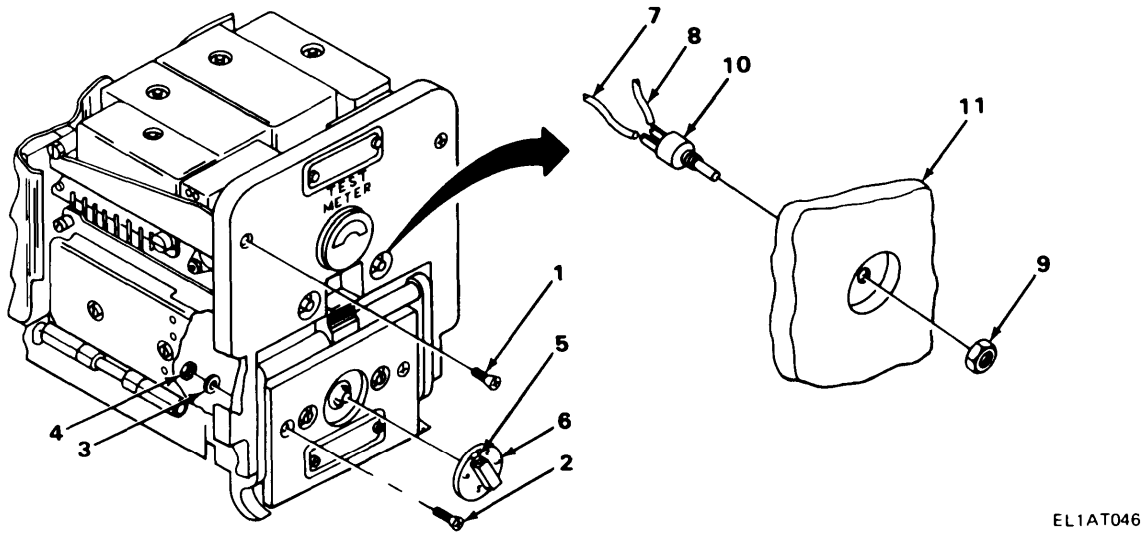
INSTALLATION

1. Install meter (13) and gasket (14) into front panel (15).
2. Install gasket (12) and knurled nut (11). Hand tighten securely.
3. Install black wire lug (10) and screw (9), and white wire lug (8) and screw (7).
4. Using wrench, tighten screws (7 and 9).
5. Position front panel (15) on chassis and install two screws (1), two screws (2), flat washers (3), and nuts (4).
6. Using screwdriver and wrench, tighten screws (1 and 2) and nuts (4).
7. Install TEST SWITCH knob (6) on switch.
8. Using hex wrench, tighten setscrew (5).

FOLLOW-ON MAINTENANCE: Install A8700 assembly (para 2-45).

2-54. SQ DIS SWITCH S9602 AND XMTR TEST SWITCH S9603 REPLACEMENT.

MATERIALS/PARTS: Switch, push, S9602 and S9603 (P/N SMC 619497)
PRELIMINARY PROCEDURE: Remove A8700 assembly (para 2-45).



REMOVAL

1. Using screwdriver, remove two screws (1).
2. Using screwdriver and wrench, remove two screws (2), flat washers (3), and nuts (4).
3. Using hex wrench, loosen setscrew (5) and remove TEST SWITCH knob (6).

NOTE

Pull front panel away from chassis slightly to gain access to rear.

For SQ DIS switch, do step 4. Note difference in color of wire (7).

For XMTR TEST switch, do step 5. Note difference in color of wire (7).

4. Using soldering iron, unsolder WHT/YEL wire (7) and black wire (8).
5. Using soldering iron, unsolder WHT/ORG wire (7) and black wire (8).
6. Using socket wrench, remove nut (9) and remove switch (10) from front panel (11).

2-54. SQ DIS SWITCH S9602 AND XMTR TEST SWITCH S9603 REPLACEMENT. (CONT)

INSTALLATION

1. Position switch (10) in front panel (11) and install nut (9).
2. Using socket wrench, tighten nut (9).

CAUTION

When performing steps 3 and 4, use extreme care to prevent damaging switches.

Due to close proximity of switch terminals, use extreme care not to flow solder across switch terminals.

NOTE

For XMTR TEST switch, do step 3. Note wire color of item 7.

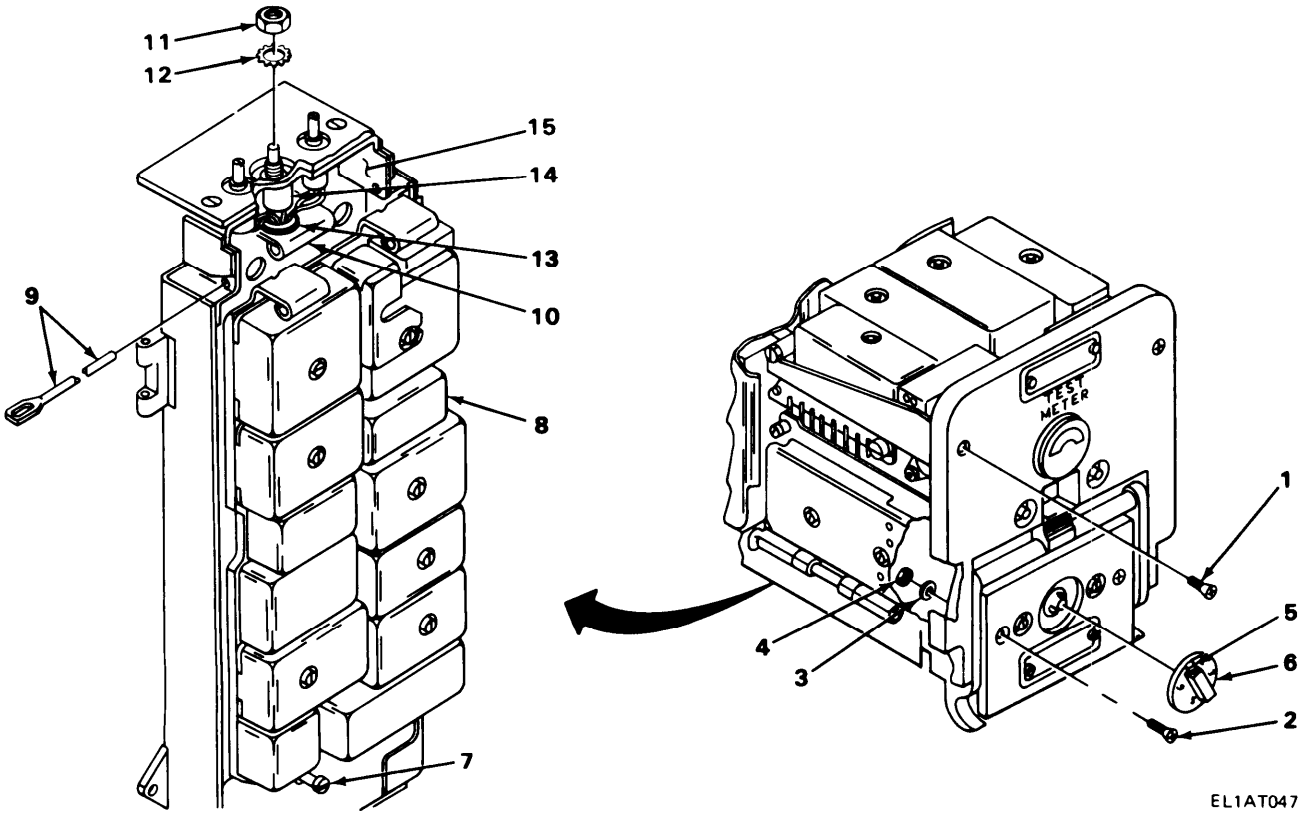
For SQ DIS switch, do step 4. Note wire color of item 7.

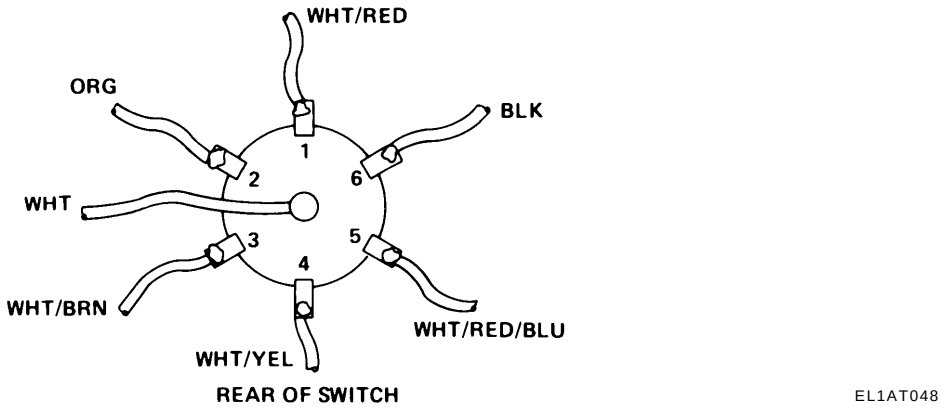
3. Using soldering iron, solder black wire (8) and WHT/ORG wire (7).
4. Using soldering iron, solder black wire (8) and WHT/YEL wire (7).
5. Position front panel (11) on chassis and install two screws (1), two screws (2), flat washers (3), and nuts (4).
6. Using screwdriver and wrench, tighten screws (1 and 2) and nuts (4).
7. Install TEST SWITCH knob (6) on switch.
8. Using hex wrench, tighten setscrew (5).

FOLLOW-ON MAINTENANCE: Install A8700 assembly (para 2-45).

2-55. TEST SWITCH S9601 REPLACEMENT.

MATERIALS/PARTS: Switch, rotary, S9601 (P/N SMC619495-1)
PRELIMINARY PROCEDURE: Remove A8700 assembly (para 2-45).





REMOVAL

1. Using screwdriver, remove two screws (1).
2. Using screwdriver and wrench, remove two screws (2), flat washers (3), and nuts (4).
3. Using hex wrench, loosen setscrew (5) and remove TEST SWITCH knob (6).

2-55. TEST SWITCH S9801 REPLACEMENT. (CONT)

NOTE

Place chassis in upright position.

Pull front panel away from chassis slightly and move out of way.

4. Loosen captive screw (7) on A3000 assembly (8).
5. Remove hinge pin (9) and lower A3000 assembly (8) from hinge (10).
6. Using wrench, remove nut (11) and lockwasher (12).
7. Push rubber grommet (13) out of hole and bend hinge (10) slightly downward to allow removal of switch (14) from mount (15).
8. Using soldering iron, unsolder seven wires from switch (14).
9. Remove switch (14).

INSTALLATION

CAUTION

Use care when performing next step to prevent damaging switch.

NOTE

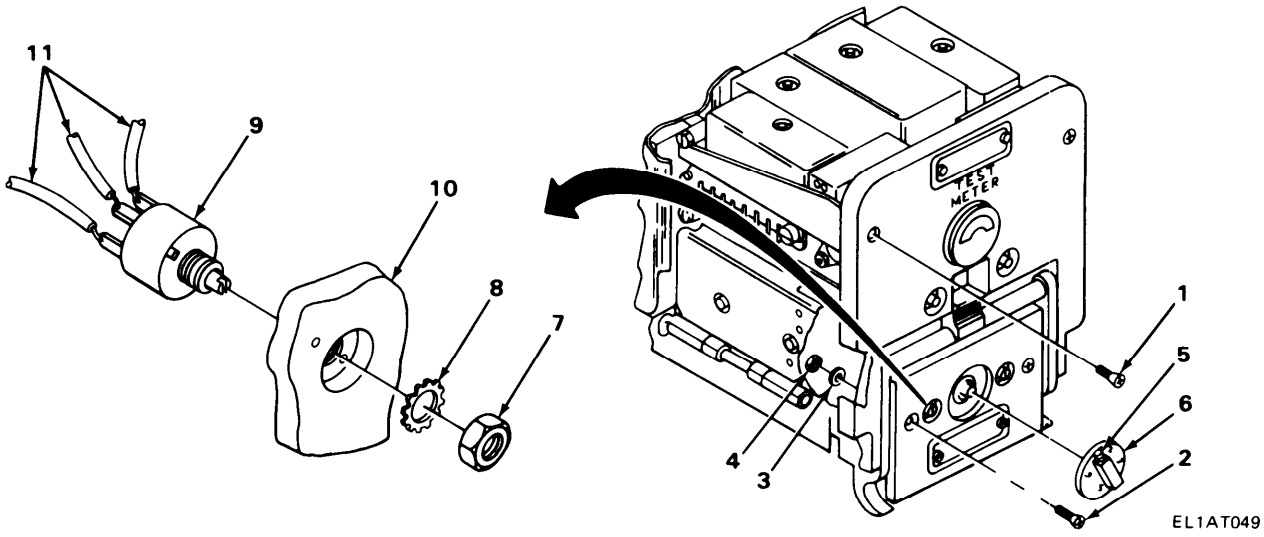
Terminal numbers are marked on switch as shown.

1. Using soldering iron, solder seven wires to switch as shown above.
2. Push switch (14) into mount (15) and install lockwasher (12) and nut (11).
3. Using wrench, tighten nut (11).
4. Push rubber grommet (13) back into hole and carefully bend hinge (10) to its original position.
5. Position A3000 assembly (8) in hinge (10) and install hinge pin (9).
6. Using screwdriver, tighten captive screw (7).
7. Position front panel (16) on chassis and install two screws (1), two screws (2), fiat washers (3), and nuts (4).
8. Using screwdriver and wrench, tighten screws (1 and 2) and nuts (4).
9. install TEST SWITCH knob (6) on switch.
10. Using hex wrench, tighten setscrew (5).

FOLLOW-ON MAINTENANCE: Install A8700 assembly (para 2-45).

2-56. SQ ADJ SWITCH R9602 REPLACEMENT.

MATERIALS/PARTS: Switch, rotary, R9602 (P/N SMC619495-2)
PRELIMINARY PROCEDURE: Remove A8700 assembly (para 2-45).



REMOVAL

1. Using screwdriver, remove two screws (1).
2. Using screwdriver and wrench, remove two screws (2), flat washers (3), and nuts (4).
3. Using hex wrench, loosen setscrew (5) and remove TEST SWITCH knob (6).

NOTE

Place chassis in upright position.

Pull front panel away from chassis slightly and move out of way.

4. Using wrench, remove nut (7) and Iockwasher (8).
5. Carefully remove switch (9) from mount (10).
6. Using soldering iron, carefully remove and resolder three wires (11) from defective switch to replacement switch one at a time.

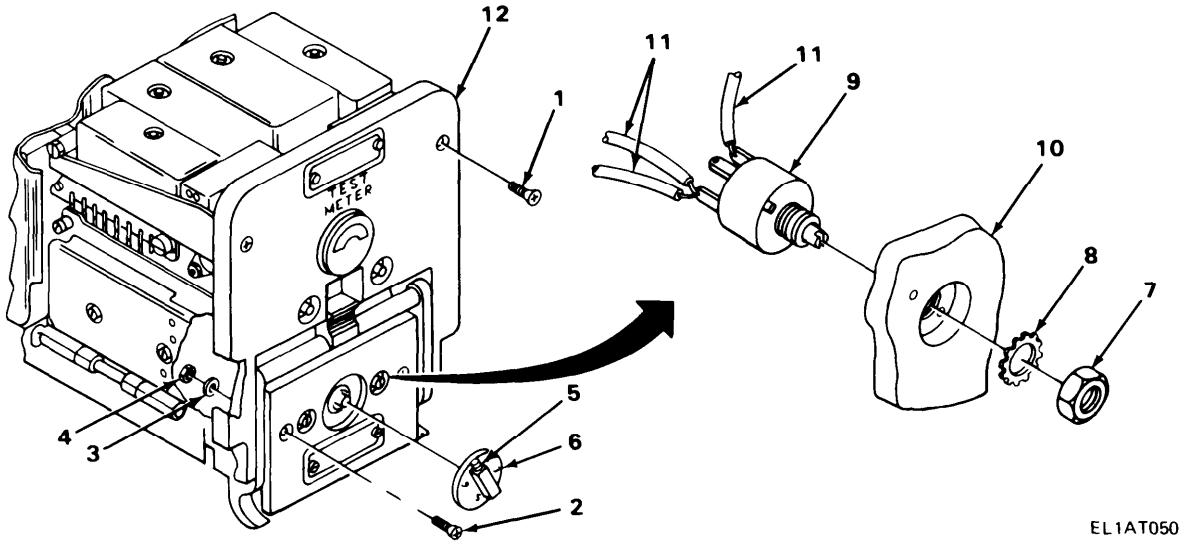
INSTALLATION

1. Position switch (9) in mount (10) and install Iockwasher (8) and nut (7).
2. Using wrench, tighten nut (7).
3. Position front panel (12) on chassis and install two screws (1), two screws (2), flat washers (3), and nuts (4).
4. Using screwdriver and wrench, tighten screws (1 and 2) and nuts (4).
5. Install TEST SWITCH knob (6) on switch.
6. Using hex wrench, tighten setscrew (5).

FOLLOW-ON MAINTENANCE: Install A8700 assembly (para 2-45).

2-57. XMTR HI-LO SWITCH S9604 REPLACEMENT.

MATERIALS/PARTS: Resistor, variable, S9604 (P/N RV6NAYSL253A)
PRELIMINARY PROCEDURE: Remove A8700 assembly (para 2-45).



REMOVAL

1. Using screwdriver, remove two screws (1).
2. Using screwdriver and wrench, remove two screws (2), flat washers (3), and nuts (4).
3. Using hex wrench, loosen setscrew (5) and remove TEST SWITCH knob (6).

NOTE

Place chassis in upright position.

Pull front panel away from chassis slightly and move out of way.

4. Using wrench, remove nut (7) and lockwasher (8).
5. Carefully remove switch (9) from mount (10).
6. Using soldering iron, remove and resolder three wires (11) from defective switch to replacement switch one at a time.

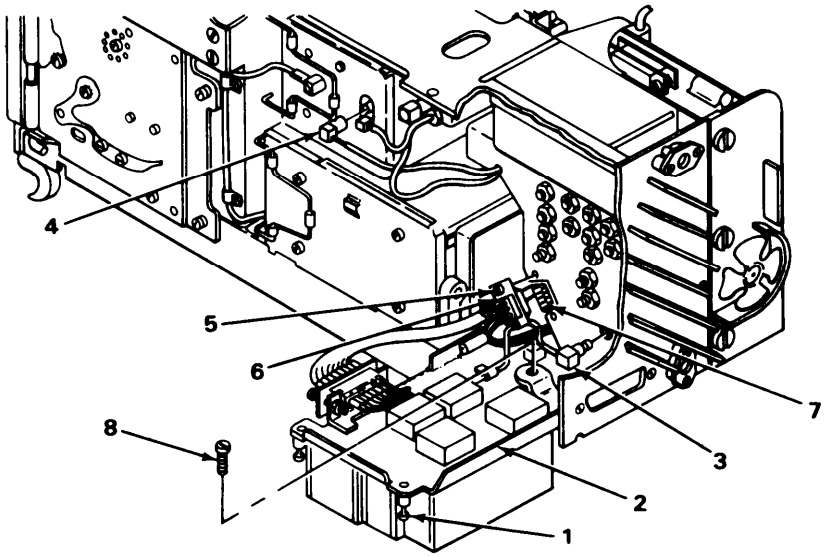
INSTALLATION

1. Position switch (9) in mount (10) and install lockwasher (8) and nut (7).
2. Using wrench, tighten nut (7).
3. Position front panel (12) on chassis and install two screws (1), two screws (2), flat washers (3), and nuts (4).
4. Using screwdriver and wrench, tighten screws (1 and 2) and nuts (4).
5. Install TEST SWITCH knob (6) on switch.
6. Using hex wrench, tighten setscrew (5).

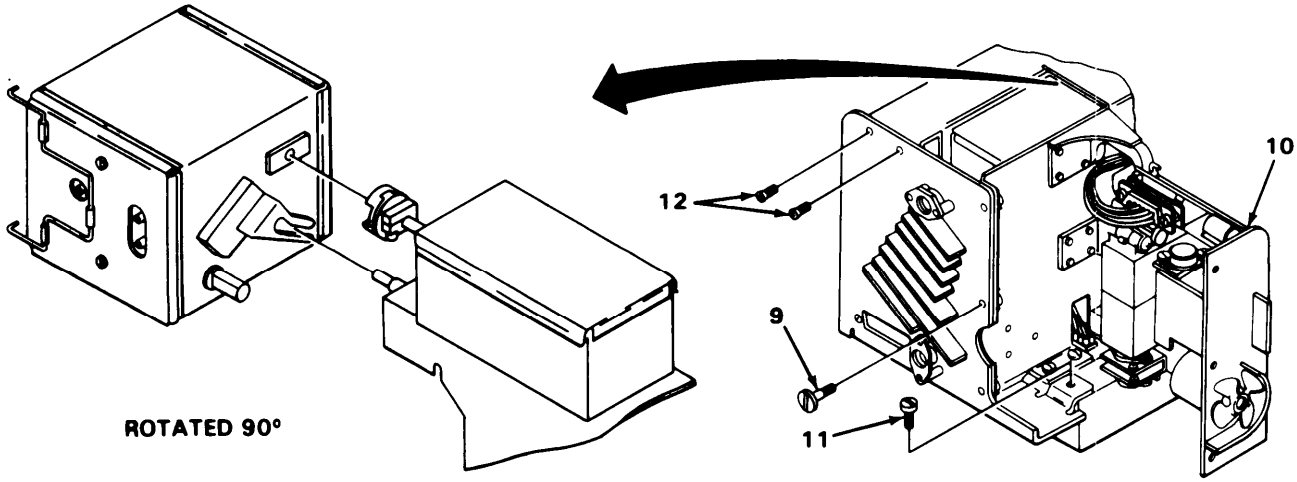
FOLLOW-ON MAINTENANCE: Install A8700 assembly (para 2-45).

2-58. A6500 ASSEMBLY REPLACEMENT.

MATERIALS/PARTS: Amplifier, radio frequency, A6500 (P/N SME619596)
PRELIMINARY PROCEDURE: Remove case (para 2-39).



EL1AT051



EL1AT052

2-58. A6500 ASSEMBLY REPLACEMENT. (CONT)

REMOVAL

1. Using screwdriver, loosen two captive screws (1) and lower A4500 assembly (2).
2. Disconnect white wire (P6502) (3) from J6502.
3. Disconnect gray wire (P6001) (4) from J6001.
4. Using screwdriver, loosen two captive screws (5) and unplug connector P6503 (6) from J6503 (7).
5. Using screwdriver, remove screw (8) from chassis.
6. Using screwdriver, remove three shouldered screws (9) and swing out A9500 assembly (10).
7. Using screwdriver, remove screw (11) from chassis.
8. Using screwdriver, remove two screws (12) from upper support.
9. Pull A6500 assembly straight back to disconnect from mechanical linkage as shown in detailed view.

INSTALLATION

NOTE

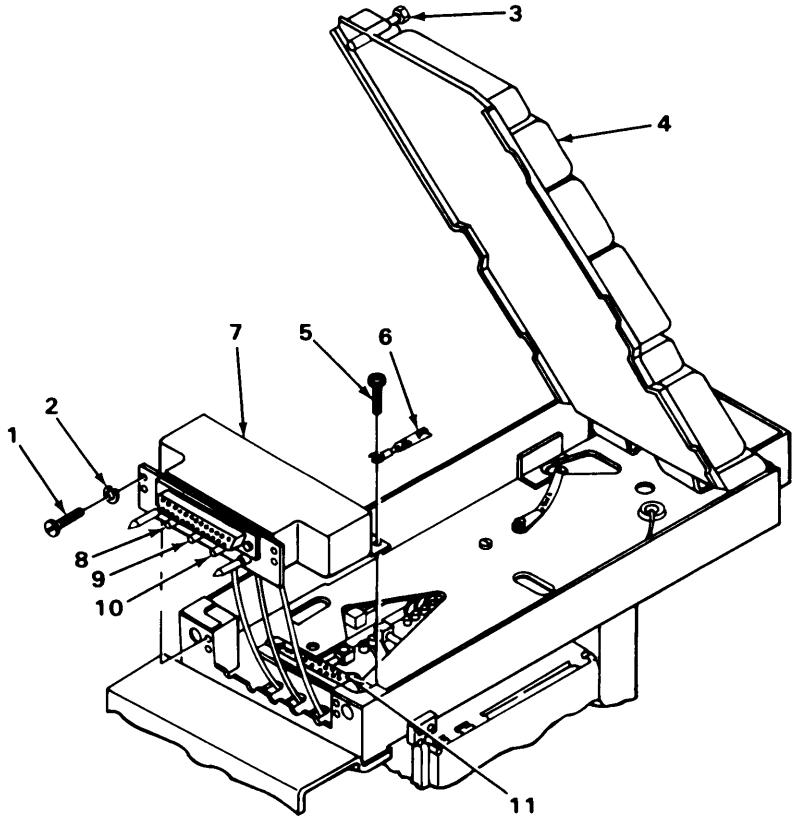
Use care when performing next step so as not to disturb positioning of mechanical linkage couplers.

1. Install A6500 assembly, alining couplers as shown in detailed view.
2. Install two screws (12) and, using screwdriver, tighten.
3. Install screw (11) and, using screwdriver, tighten.
4. Swing A9500 assembly (10) closed and install three shouldered screws (9).
5. Using screwdriver, tighten three shouldered screws (9).
6. Install screw (8) and, using screwdriver, tighten.
7. Plug connector P6503 (6) into J6503 (7).
8. Using screwdriver, tighten two captive screws (5).
9. Connect gray wire (P6001) (4) to J6001.
10. Connect white wire (P6502) (3) to J6502.
11. Raise A4500 assembly (2).
12. Using screwdriver, tighten two captive screws (1).

FOLLOW-ON MAINTENANCE: Install case (para 2-39).

RADIO INTERFERENCE FILTER FL9601 REPLACEMENT.

MATERIALS/PARTS: Filter, radio interference, FL9601 (P/N SMD619508)
PRELIMINARY PROCEDURE: Remove case (para 2-39).
TOOLS: Electrical Contact Extractor, TL-711A/ARM-79



EL1AT053

REMOVAL

1. Using screwdriver, remove four screws (1) and lockwashers (2).

NOTE

To gain access to rear of filter, A3000 assembly must first be raised.

2-59. RADIO INTERFERENCE FILTER FL9601 REPLACEMENT. (CONT)

2. Using screwdriver, loosen one captive screw (3) and raise A3000 assembly (4).
3. Using screwdriver, remove screw (5) and ground strap (6).
4. Raise filter (7) and, using electrical contact extractor, remove brown rf cable (8), violet rf cable (9), and orange rf cable (10) from filter (7).
5. Remove filter (7).

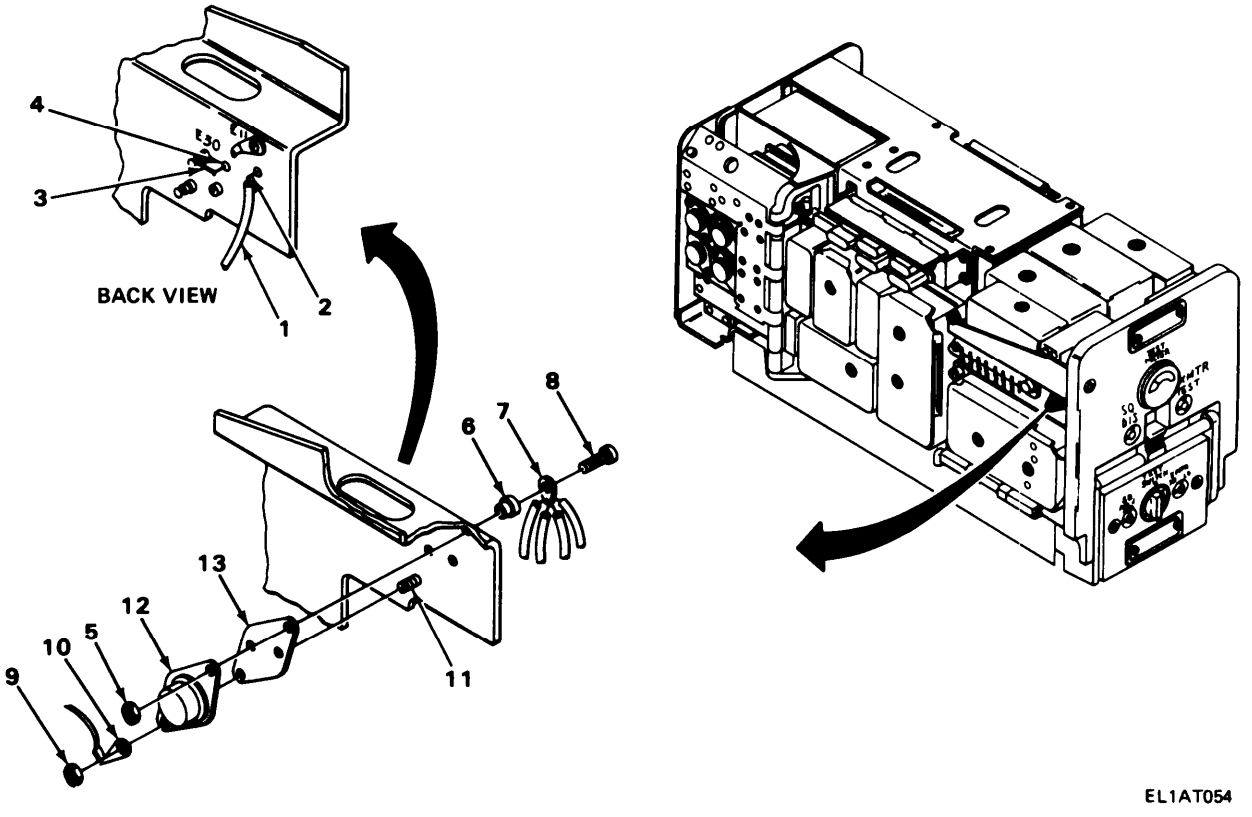
INSTALLATION

1. Connect orange rf cable (10), violet rf cable (9), and brown rf cable (8).
2. Position filter (7) in chassis and couple to connector J9601 (11).
3. Install ground strap (6) and screw (5) and, using screwdriver, tighten.
4. Lower A3000 assembly (4) into position.
5. Using screwdriver, tighten one captive screw (3).
6. Install four screws (1) and lockwashers (2) and, using screwdriver, tighten.

FOLLOW-ON MAINTENANCE: Install case (para 2-39).

2-60. TRANSISTOR Q9601 REPLACEMENT.

MATERIALS/PARTS: Transistor, Q9601 (P/N JAN 2N1479)
Compound, heat sink, Dow Corning, DC-340 (item 1, appendix B)
PRELIMINARY PROCEDURE: Remove A8700 assembly (para 2-45).



REMOVAL

1. Using soldering iron, unsolder yellow wire (1) from pin (2) and jumper wire (3) from pin (4).
2. Using socket wrench and screwdriver, remove nut (5), bushing (6), wire lug (7), and screw (8).

NOTE

Use care when performing next step so as not to push screw from hole.

3. Using socket wrench and screwdriver, remove nut (9) and wire lug (10) from screw (11).

2-60. TRANSISTOR Q9601 REPLACEMENT. (CONT)

NOTE

Due to inaccessible location of screw, it is advised that it not be removed.

4. Remove transistor (12) and insulator (13).

INSTALLATION

1. Coat both sides of insulator (13) with heat sink compound.

NOTE

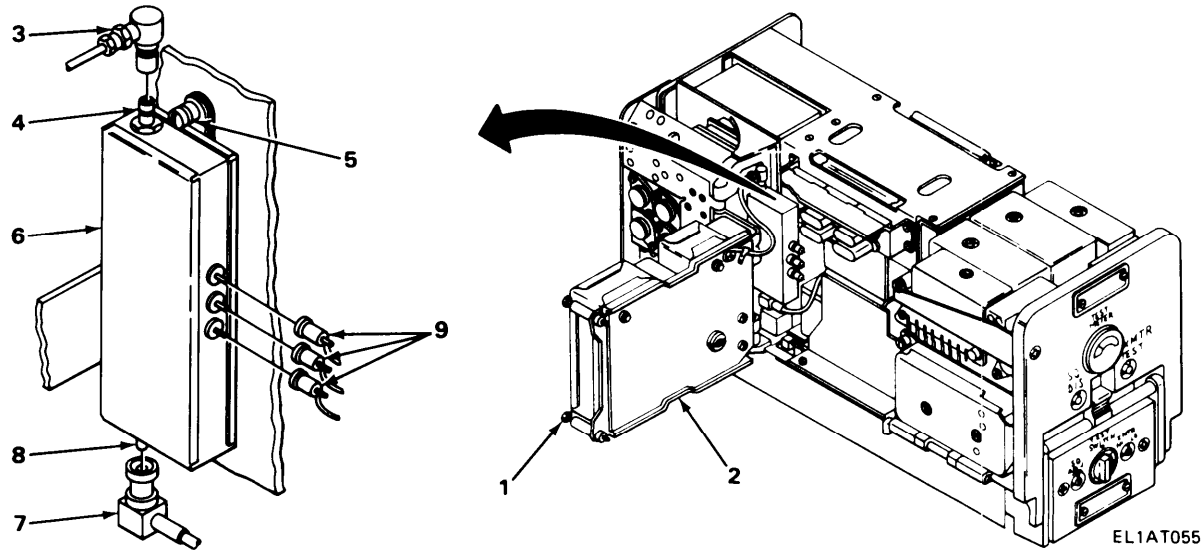
Be careful not to push screw from hole.

2. While holding screw (11) against mount, position insulator (13) and transistor (12) on mount alining pins on transistor with holes in mount.
3. Install wire lug (10) and nut (9).
4. Using socket wrench and screwdriver, tighten nut (9) and screw (11).
5. Install screw (8), wire lug (7), bushing (6), and nut (5).
6. Using socket wrench and screwdriver, tighten nut (5) and screw (8).
7. Using soldering iron, solder jumper wire (3) to pin (4) and yellow wire (1) to pin (2).

FOLLOW-ON MAINTENANCE: Install A8700 assembly (para 2-45).

2-61. A4900 ASSEMBLY REPLACEMENT.

MATERIALS/PARTS: Attenuator, variable, A4900 (P/N SME619695)
PRELIMINARY PROCEDURE: Remove case (para 2-39).



REMOVAL

1. Using screwdriver, loosen two captive screws (1) and swing out A4000 assembly (2).
2. Disconnect blue wire (P4902) (3) from J4902 (4).
3. Using screwdriver, loosen two captive screws (5) and move A4900 assembly (6) away from chassis.
4. Disconnect blue wire (P4901) (7) from J4901 (8).
5. Disconnect three color-coded wire plugs (9).
6. Remove A4900 assembly (6).

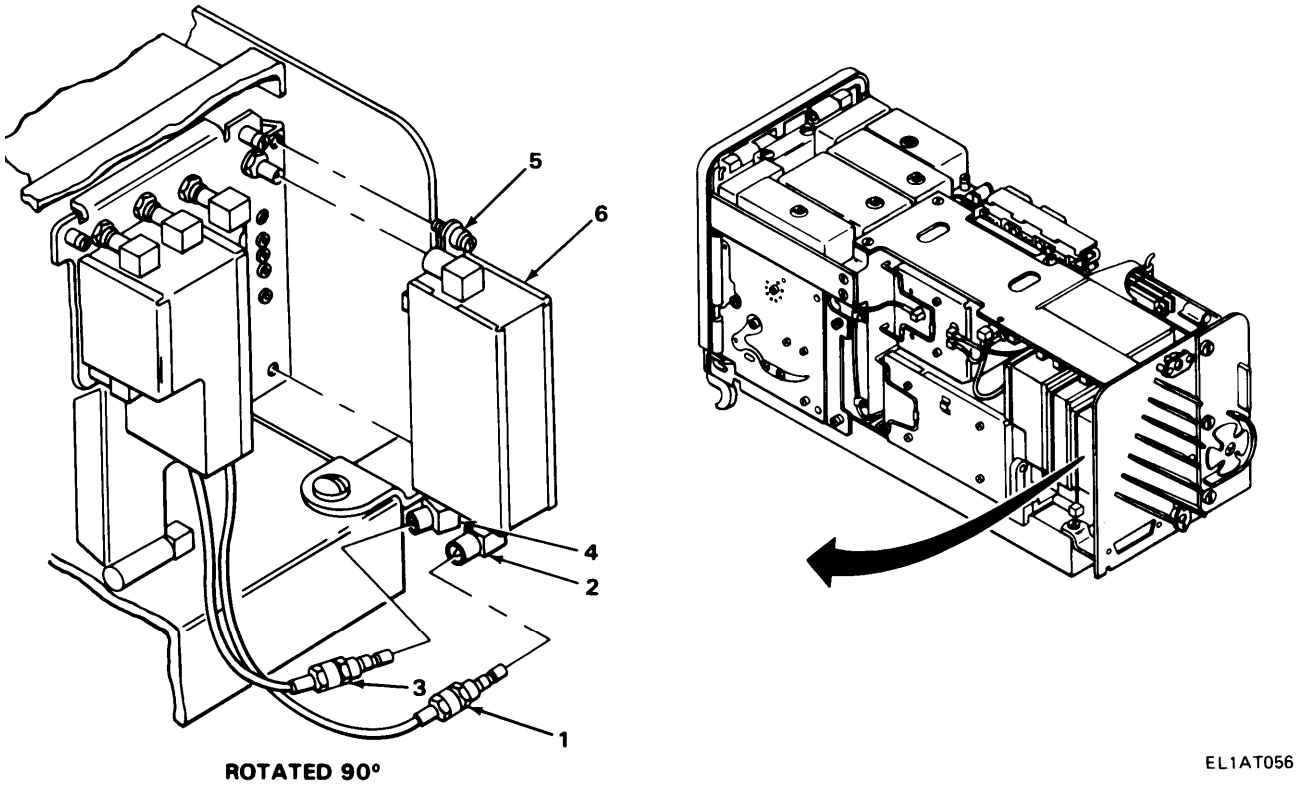
INSTALLATION

1. Connect three color-coded wire plugs (9).
2. Connect blue wire (P4901) (7) to J4901 (8).
3. Position A4900 assembly (6) in chassis and, using screwdriver, tighten two captive screws (5).
4. Connect blue wire (P4902) (3) to J4902 (4).
5. Close A4000 assembly (2) and, using screwdriver, tighten two captive screws (1).

FOLLOW-ON MAINTENANCE: Install case (para 2-39).

2-62. RF ATTENUATOR AND DIODE SWITCH 24501 REPLACEMENT.

MATERIALS/PARTS: Attenuator and switch assembly, Z4501 (P/N SMD619719)
PRELIMINARY PROCEDURE: Remove case (para 2-39).



REMOVAL

1. Disconnect violet wire (P4503) (1) from J4503 (2) and brown wire (3) from J4502 (4).
2. Using screwdriver, loosen two captive screws (5).
3. Pull Z4501 assembly (6) straight out to remove.

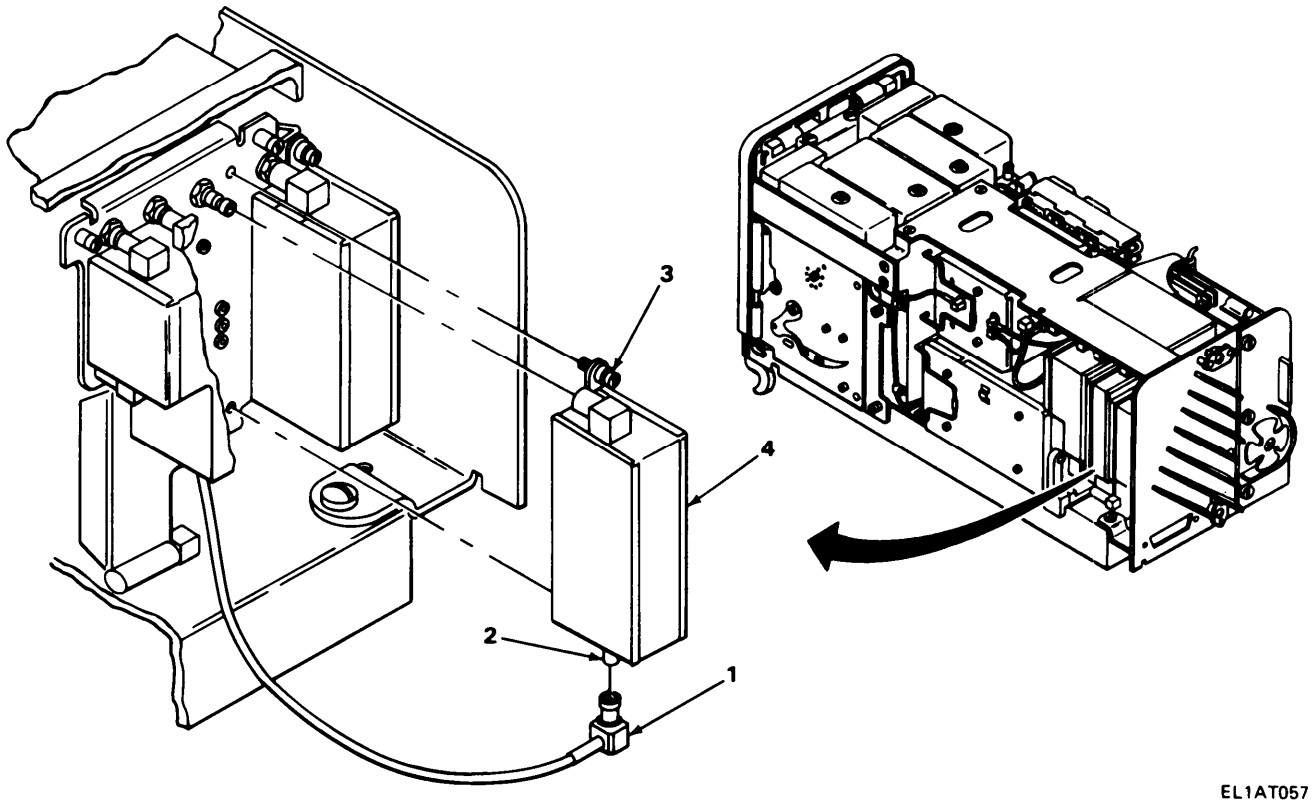
INSTALLATION

1. Position pins on Z4501 assembly (6) on board and push into place.
2. Using screwdriver, tighten two captive screws (5).
3. Connect brown wire (3) to J4502 (4) and violet wire (P4503) (1) on J4503 (2).

FOLLOW-ON MAINTENANCE: Install case (para 2-39).

2-63. REFLECTOMETER AND SIDETONE DETECTOR 24502 REPLACEMENT.

MATERIALS/PARTS: Control assembly, Z4502 (P/N SMD619733)
PRELIMINARY PROCEDURE: Remove case (para 2-39).



REMOVAL

1. Disconnect orange wire (P4505) (1) from J4505 (2).
2. Using screwdriver, loosen two captive screws (3).
3. Pull Z4502 assembly (4) straight out to remove.

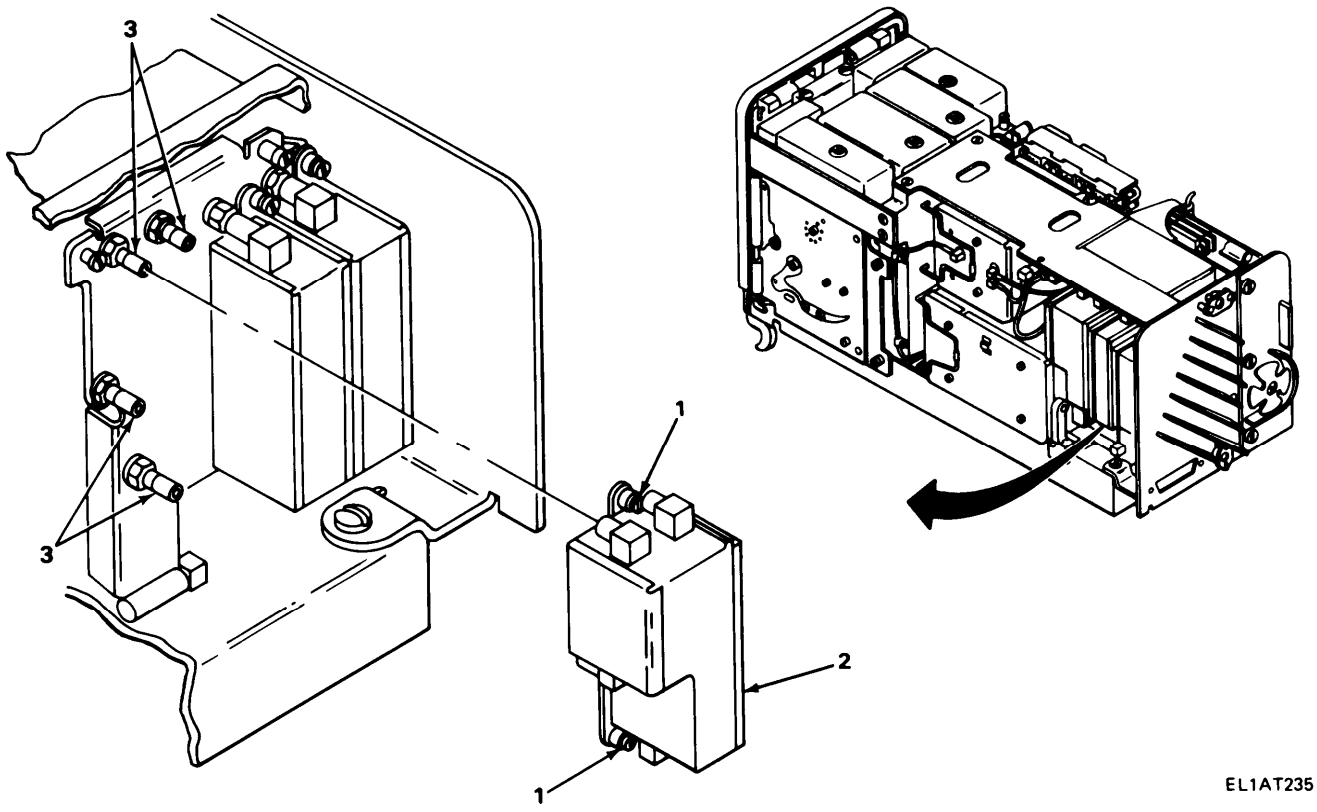
INSTALLATION

1. Position pins on Z4502 assembly (4) on board and push into place.
2. Using screwdriver, tighten two captive screws (3).
3. Connect orange wire (P4505) (1) to J4505 (2).

FOLLOW-ON MAINTENANCE: Install case (para 2-39).

2-64. LOW-PASS FILTER FL4501 REPLACEMENT.

MATERIALS/PARTS: Filter, low-pass, FL4501 (P/N SMD619747)
PRELIMINARY PROCEDURE: Remove case (para 2-39).



REMOVAL

1. Using screwdriver, loosen two captive screws (1).
2. Pull FL4501 assembly (2) straight out to remove.

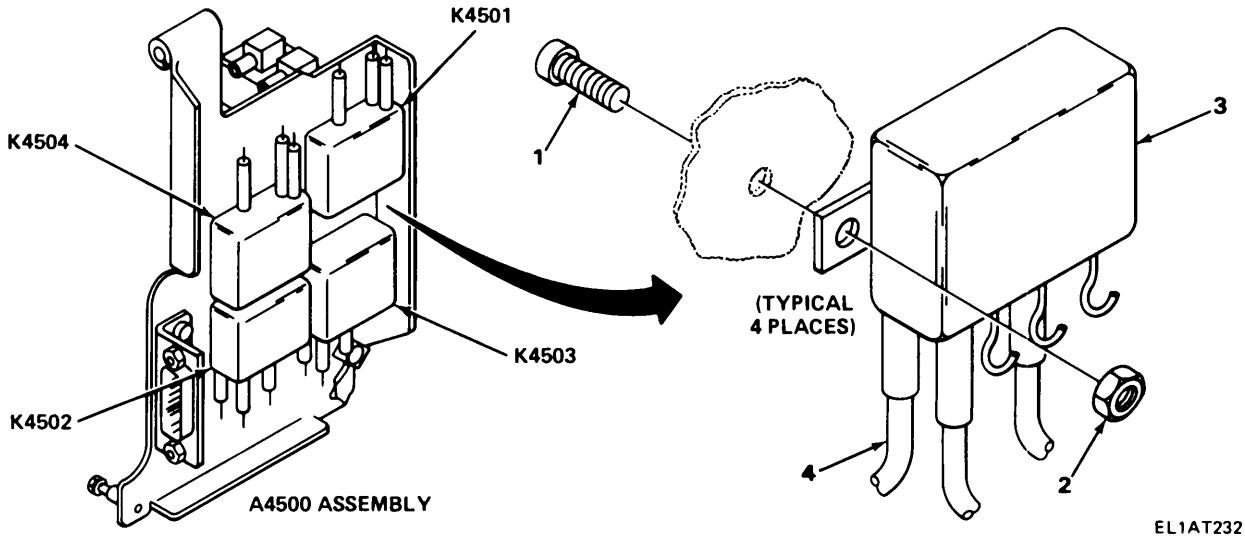
INSTALLATION

1. Position FL4501 assembly (2) on four jacks (3) and push into place.
2. Using screwdriver, tighten two captive screws (1).

FOLLOW-ON MAINTENANCE: Install case (para 2-39).

2-65. RELAYS K4501 THROUGH K4504 REPLACEMENT.

MATERIALS/PARTS: Relay, armature, K4501 (P/N SMD6201 14)
Relay, armature, K4502 (P/N SMD6201 16)
Relay, armature, K4503 (P/N SMD6201 18)
Relay, armature, K4504 (P/N SMD620120)
PRELIMINARY PROCEDURE: Remove case (para 2-39).



REMOVAL

NOTE

For removal of relays K4501 or K4503, first remove rf attenuator and diode switch Z4501 (para 2-62).

For removal of relays K4502 or K4504, first remove reflectometer and sidetone detector Z4502 (para 2-63) and low-pass filter FL4501 (para 2-64).

Steps given are typical for all relays.

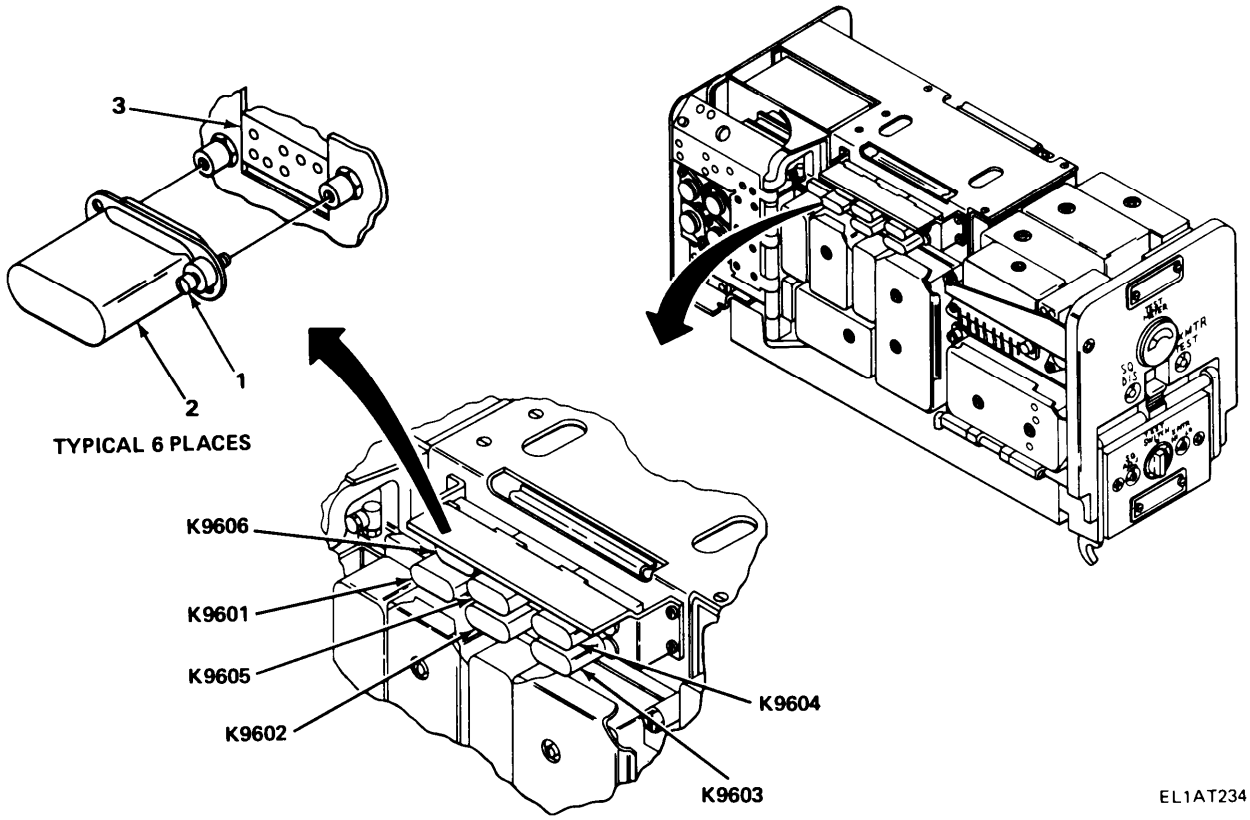
1. Using screwdriver and wrench, remove two screws (1) and nuts (2) from relay (3).
2. Using soldering iron, unsolder wires (4) one at a time and resolder to replacement relay (3).

INSTALLATION

1. Position relay (3) on assembly and install two screws (1) and nuts (2).
2. Using screwdriver and wrench, tighten two screws (1) and nuts (2).
3. Install applicable components as noted above.

2-66. RELAYS K9601 THROUGH K9606 REPLACEMENT.

MAERIALS PARTS: Relay, armature, K9601 through K9605 (P/N SMC41433)
Relay, dummy, K9606 (P/N SMC620064)
PRELIMINARY PROCEDURE: Remove case (para 2-39).



REMOVAL

NOTE

Steps given are typical for all relays.

1. Using screwdriver, loosen two captive screws (1).
2. Pull relay (2) from socket (3).

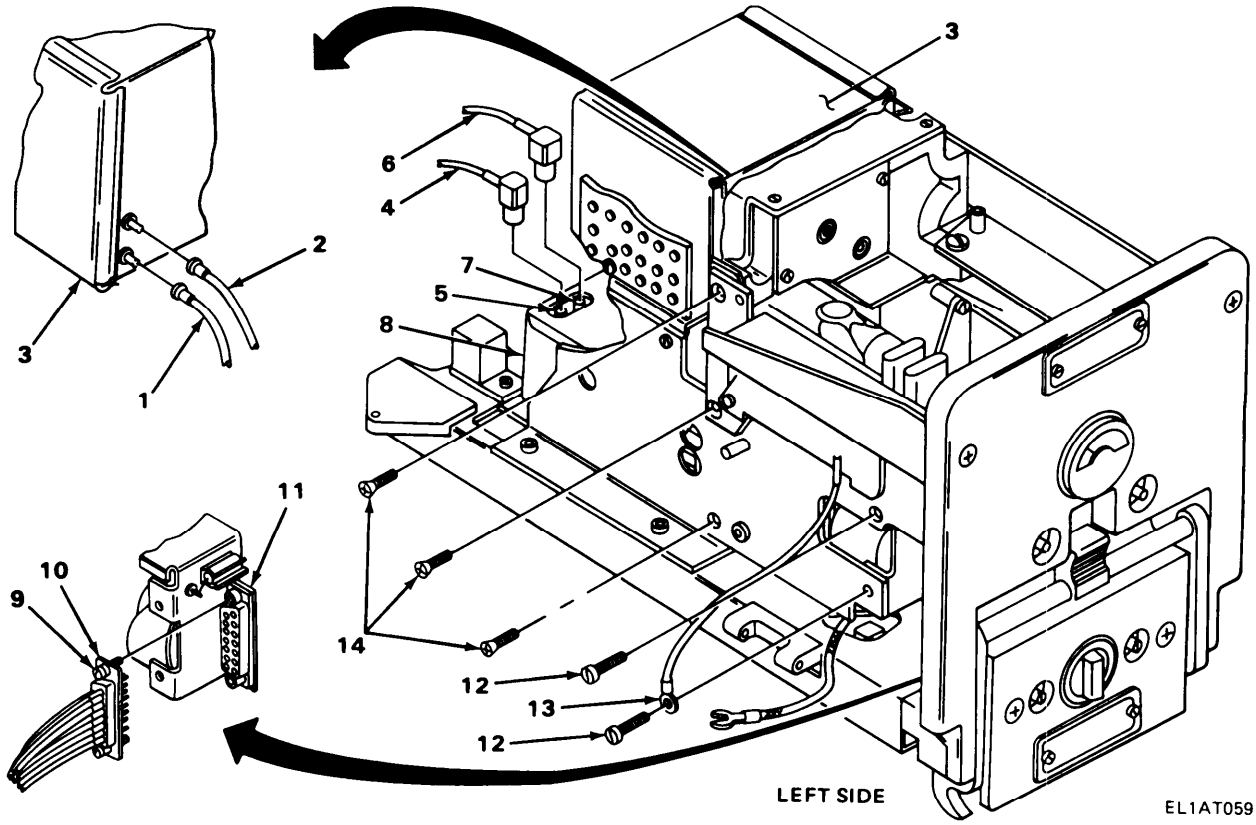
INSTALLATION

1. Position relay (2) in socket (3) and push into place.
2. Using screwdriver, tighten two captive screws (11).

FOLLOW-ON MAINTENANCE: Install case (para 2-39).

2-67. A1000, A2000, A6000, AND A9700 ASSEMBLY REPLACEMENT.

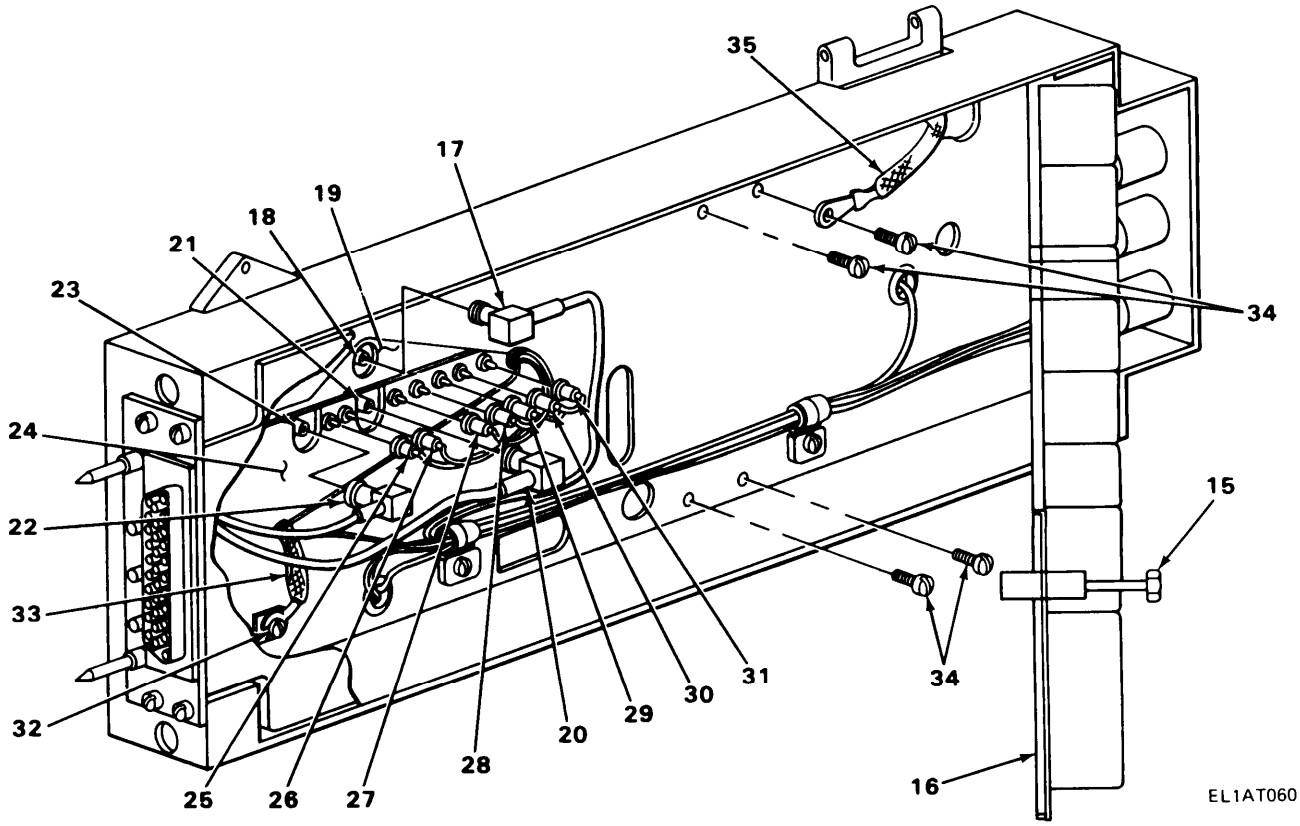
PRELIMINARY PROCEDURE: Remove A4000 assembly (para 2-41).
Remove A4500 assembly (para 2-49).
Remove A4800 assembly (para 2-40).
Remove A5500 assembly (para 2-44).
Remove A6500 assembly (para 2-58).
Remove A8700 assembly (para 2-45).
Remove A9500 assembly (para 2-42).



REMOVAL

1. Disconnect orange color-coded wire plug (1) and black color-coded wire plug (2) from A6000 assembly (3).
2. Disconnect black wire (P2002) (4) from J2002 (5) and orange wire (P2001) (6) from J2001 (7) on A2000 assembly (8).
3. Disconnect wires (4 and 6) from wire clip on A2000 assembly (8).
4. Using screwdriver, loosen two captive screws (9) and unplug connector P9701 (10) from J9701 (11).
5. Using screwdriver, remove two screws (12) and ground lug (13).
6. Using screwdriver, remove three screws (14).

2-67. A1000, A2000, A6000, AND A9700 ASSEMBLY REPLACEMENT. (CONT)



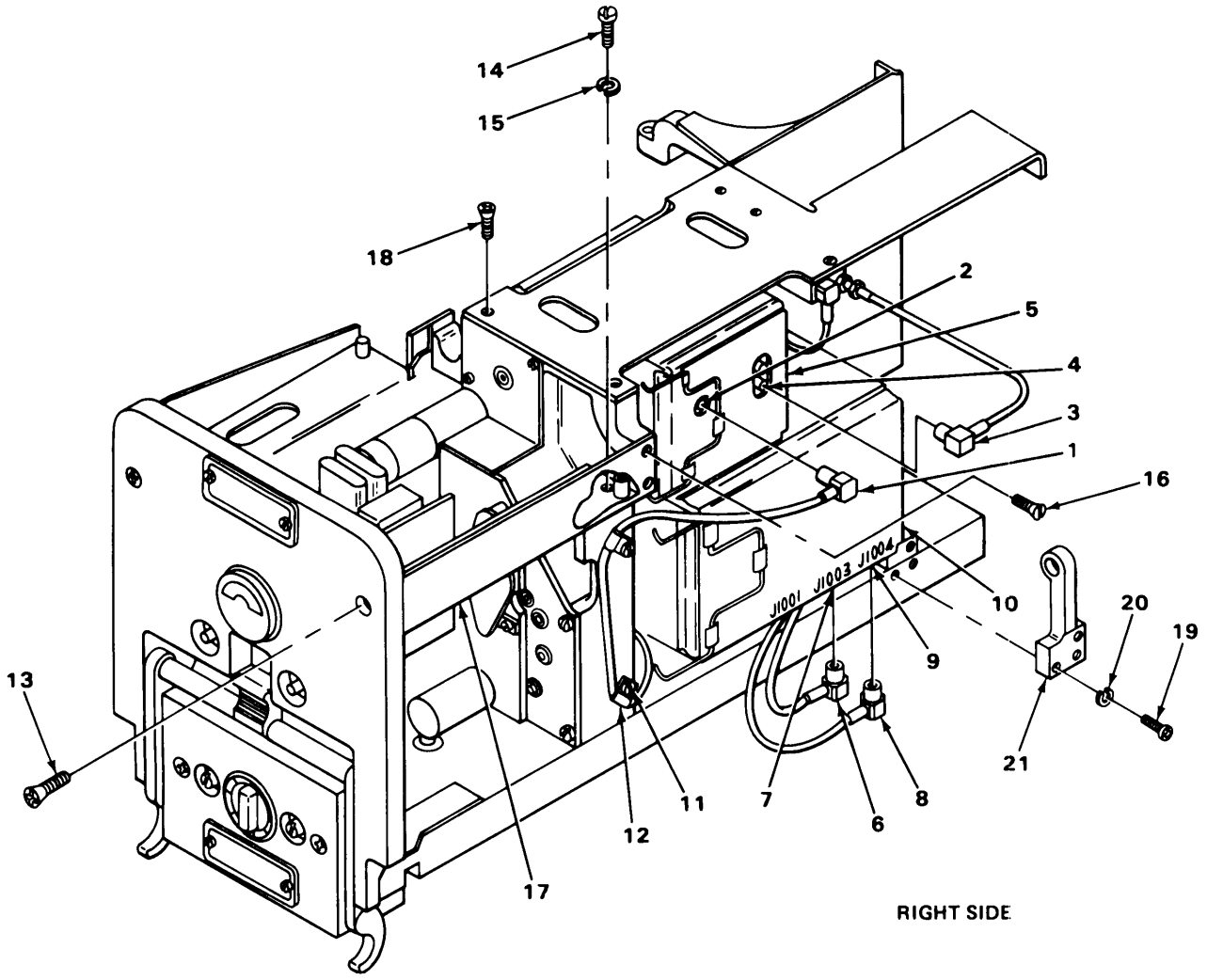
7. Using screwdriver, loosen one captive screw (15) and swing open A3000 assembly (16).
8. Disconnect red wire (P2003) (17) from J2003 (18) on A2000 assembly (19).
9. Disconnect blue wire (P1005) (20) from J1005 (21) and yellow wire (P1002) (22) from J1002 (23) on A1000 assembly (24).
10. Disconnect seven color-coded wire plugs from A1000 assembly (24) as shown in table below.

TERMINAL NO.	COLOR	INDEX NO.
1	BLK	25
2	WHT	26
3	YEL	27
4	ORG	28
5	VIO	29
6	RED	30
7	BRN	31

11. Using screwdriver, loosen screw (32) and remove ground strap (33).
12. Using screwdriver, remove four screws (34) and ground strap (35).

A1000, A2000, A6000, AND A9700 ASSEMBLY REPLACEMENT. (CONT)

REMOVAL (CONT)



13. Disconnect brown wire (P6002) (1) from J6002 (2) and yellow wire (P6003) (3) from J6003 (4) on A6000 assembly (5).
14. Disconnect violet wire (P1003) (6) from J1003 (7) and green wire (P1004) (8) from J1004 (9) on A1000 assembly (10).

2-67. A1000, A2000, A6000, AND A9700 ASSEMBLY REPLACEMENT. (CONT)

15. Using screwdriver, loosen two screws (11) on wire clips (12) and remove brown wire (P6002)

16. Using screwdriver, remove one screw (13), one screw (14), and lockwasher (15).
17. Using screwdriver, remove two screws (16) and bracket (17).
18. Using screwdriver, remove two screws (18).
19. Using screwdriver, remove three screws (19) and lockwashers (20).
20. Remove A1000 assembly bracket (21).
21. Carefully raise assembly off chassis and remove.

INSTALLATION

NOTE

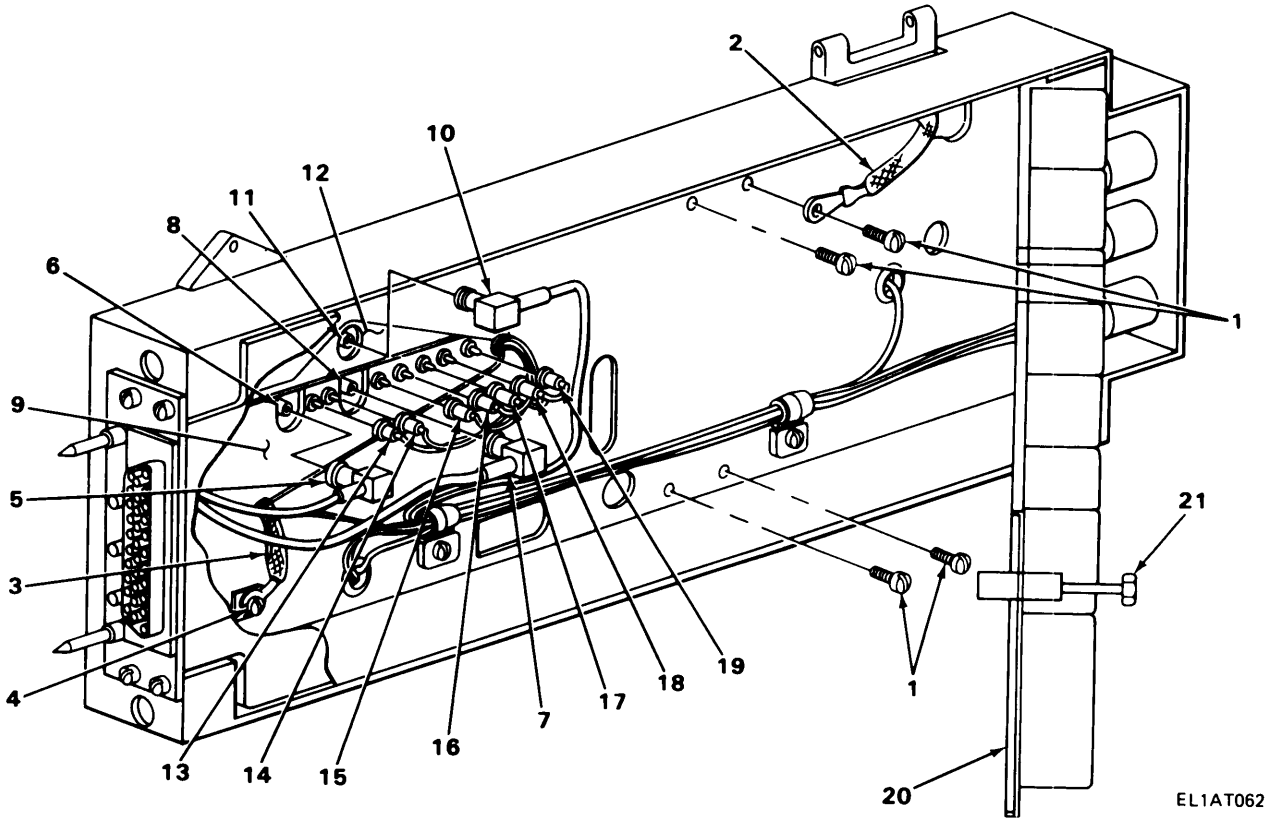
Before installing assembly, ensure seven color-coded wire plugs are pushed under chassis.

Before installing assembly, ensure green wire (P1004), violet wire (P1003), and brown wire (P6002) are hanging outside of chassis.

1. Position assembly in chassis and install two screws (18).
2. Position bracket (17) on front panel and gearbox and install two screws (16), one screw (13), one screw (14), and lockwasher (15).
3. Using screwdriver, tighten screws (13, 14,16, and 18).
4. Position A1000 assembly bracket (21) on A1000 assembly (10) and install three screws (19) and lockwashers (20).
5. Using screwdriver, tighten three screws (19).
6. Connect green wire (P1004) (8) to J1004 (9) and violet wire (P1003) (6) to J1003 (7) on A1000 assembly (10).
7. Connect yellow wire (P6003) (3) to J6003 (4) and brown wire (P6002) (1) to J6002 (2) on A6000 assembly (5).
8. Using screwdriver, loosen two screws (11) on wire clips (12) and install browon wire (P6002) (1) in wire clips (12).
9. Using screwdriver, tighten two screws (11).

2-67. A1000, A2000, A6000, AND A9700 ASSEMBLY REPLACEMENT. (CONT)

INSTALLATION (CONT)

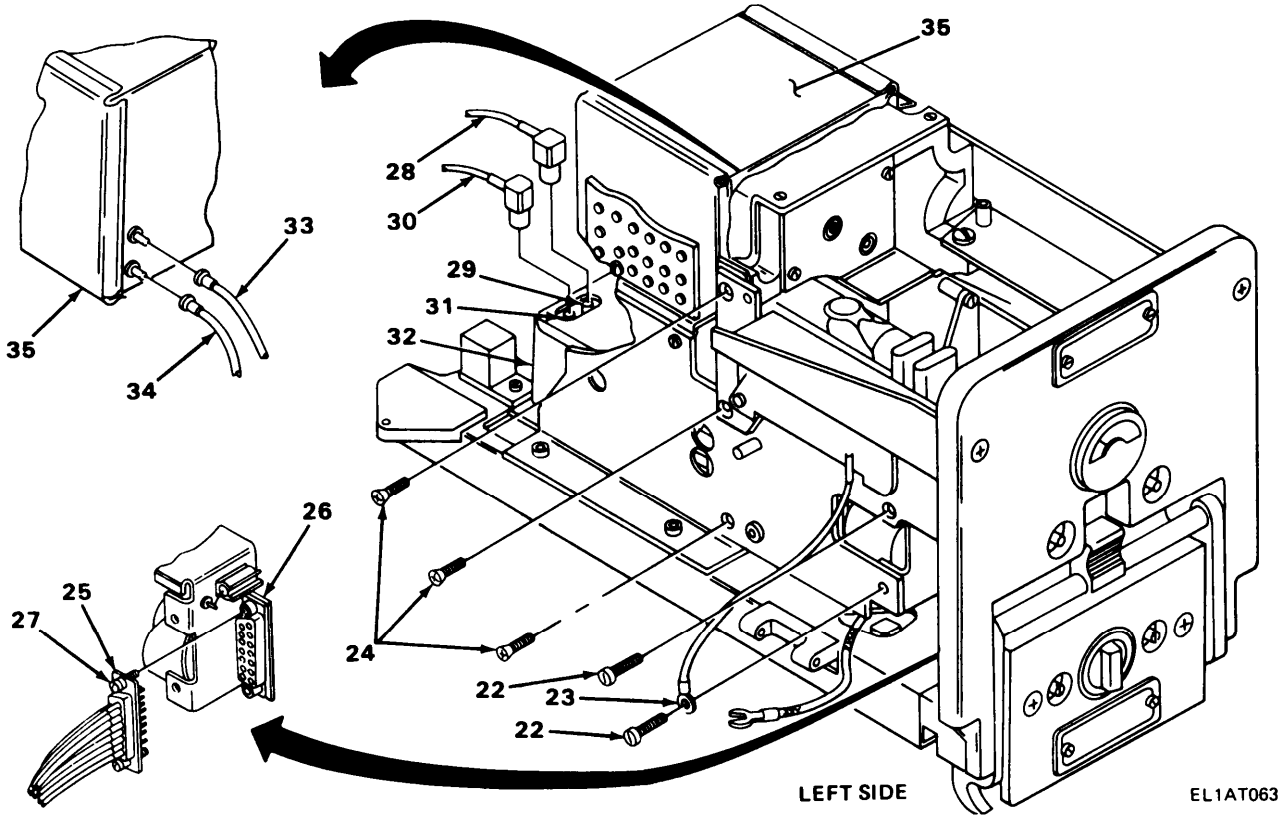


10. Install four screws (1) and ground strap (2).
11. Using screwdriver, tighten four screws (1).
12. Position ground strap (3) under screw (4).
13. Using screwdriver, tighten screw (4).
14. Connect yellow wire (P1002) (5) to J1002 (6) and blue wire (P1005) (7) to J 1005 (8) on A1000 assembly (9).
15. Connect red wire (P2003) (10) to J2003 (11) on A2000 assembly (12).
16. Connect seven color-coded wire plugs to A1000 assembly (9) as shown in following table.

TERMINAL NO.	COLOR	INDEX NO.
1	BLK	13
2	WHT	14
3	YEL	15
4	ORG	16
5	VIO	17
6	RED	18
7	BRN	19

17. Swing A3000 assembly (20) closed.
18. Using screwdriver, tighten one captive screw (21).

2-67. A1000, A2000, A6000, AND A9700 ASSEMBLY REPLACEMENT. (CONT)

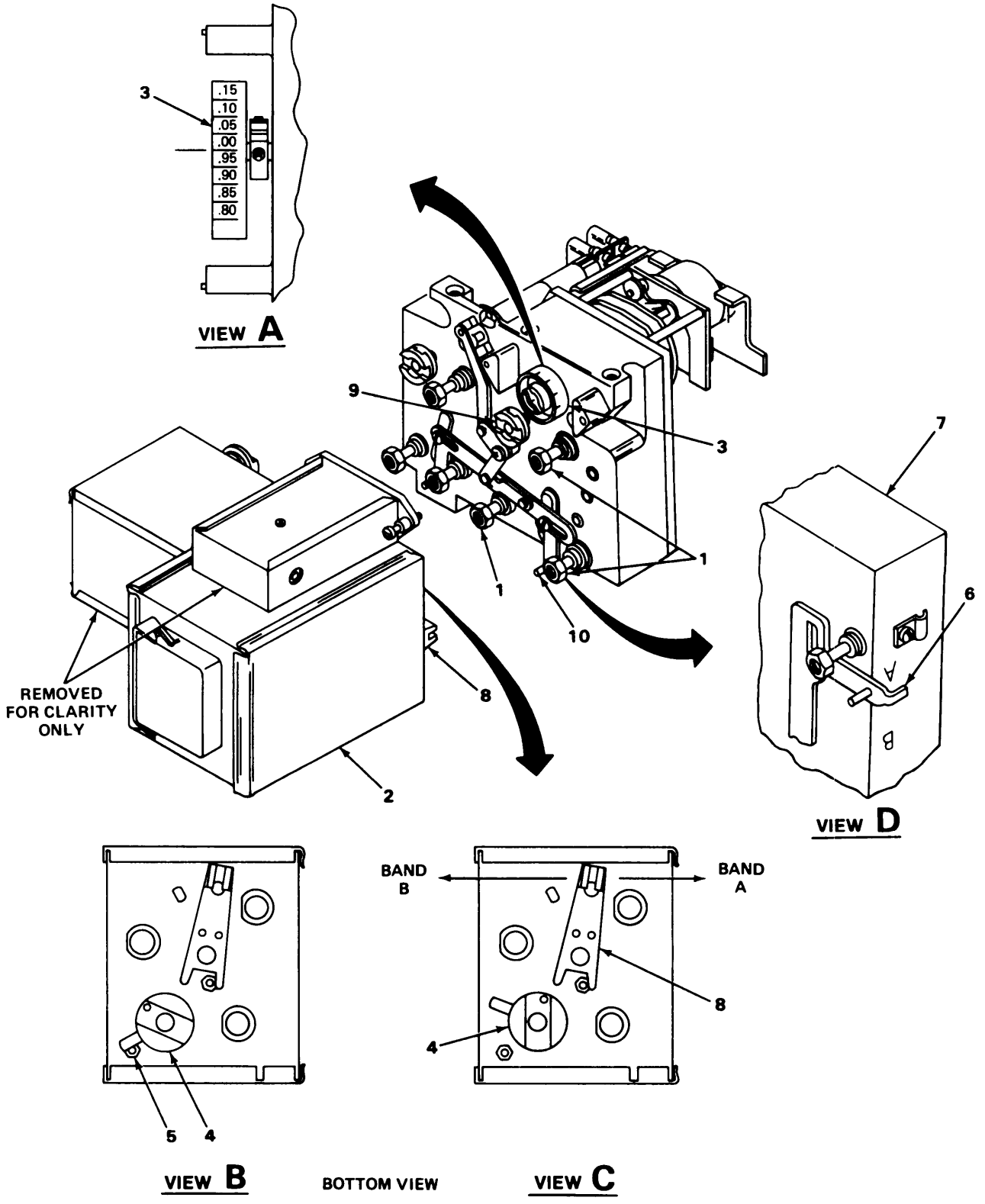


19. Install two screws (22) and ground strap (23).
20. Install three screws (24).
21. Using screwdriver, tighten screws (22 and 24).
22. Plug connector P9701 (25) into J9701 (26).
23. Using screwdriver, tighten two captive screws (27).
24. Connect orange wire (P2001) (28) to J2001 (29) and black wire (P2002) (30) to J2002 (31).
25. Connect wires (28 and 30) to wire clip on A2000 assembly (32).
26. Connect black color-coded wire plug (33) and orange color-coded wire plug (34) to A6000 assembly (35).

FOLLOW-ON MAINTENANCE: Install A9500 assembly (para 2-42).
Install A8700 assembly (para 2-45).
Install A6500 assembly (para 2-58).
Install A5500 assembly (para 2-44).
Install A4800 assembly (para 2-40).
Install A4500 assembly (para 2-49).
Install A4000 assembly (para 2-41).

2-68. A1000 ASSEMBLY REPLACEMENT.

MATERIALS/PARTS: Tuner assembly, vhf, A1000 (P/N SMD416345)
PRELIMINARY PROCEDURE: Remove A1000, A2000, A6000, and A9700 assembly (para 2-67).



2-68. A1000 ASSEMBLY REPLACEMENT. (CONT)

REMOVAL

1. Using wrench, loosen three captive nuts (1).
2. Remove A1000 assembly (2).

INSTALLATION

1. Turn dial (3) counterclockwise to position .00 setting as shown in view A.
2. Turn coupler (4) counterclockwise to stop (5) (view B).
3. Turn coupler (4) clockwise to position shown in view C.
4. Check pointer (6) on assembly which indicates band position of gearbox (7) (view D).
5. Move linkage arm (8) to band A or band B position as indicated by pointer (6).
6. Position A1000 assembly (2) on captive nut towers and aline couplers (4 and 9), and linkage arm (8) and band switch cam (10).

NOTE

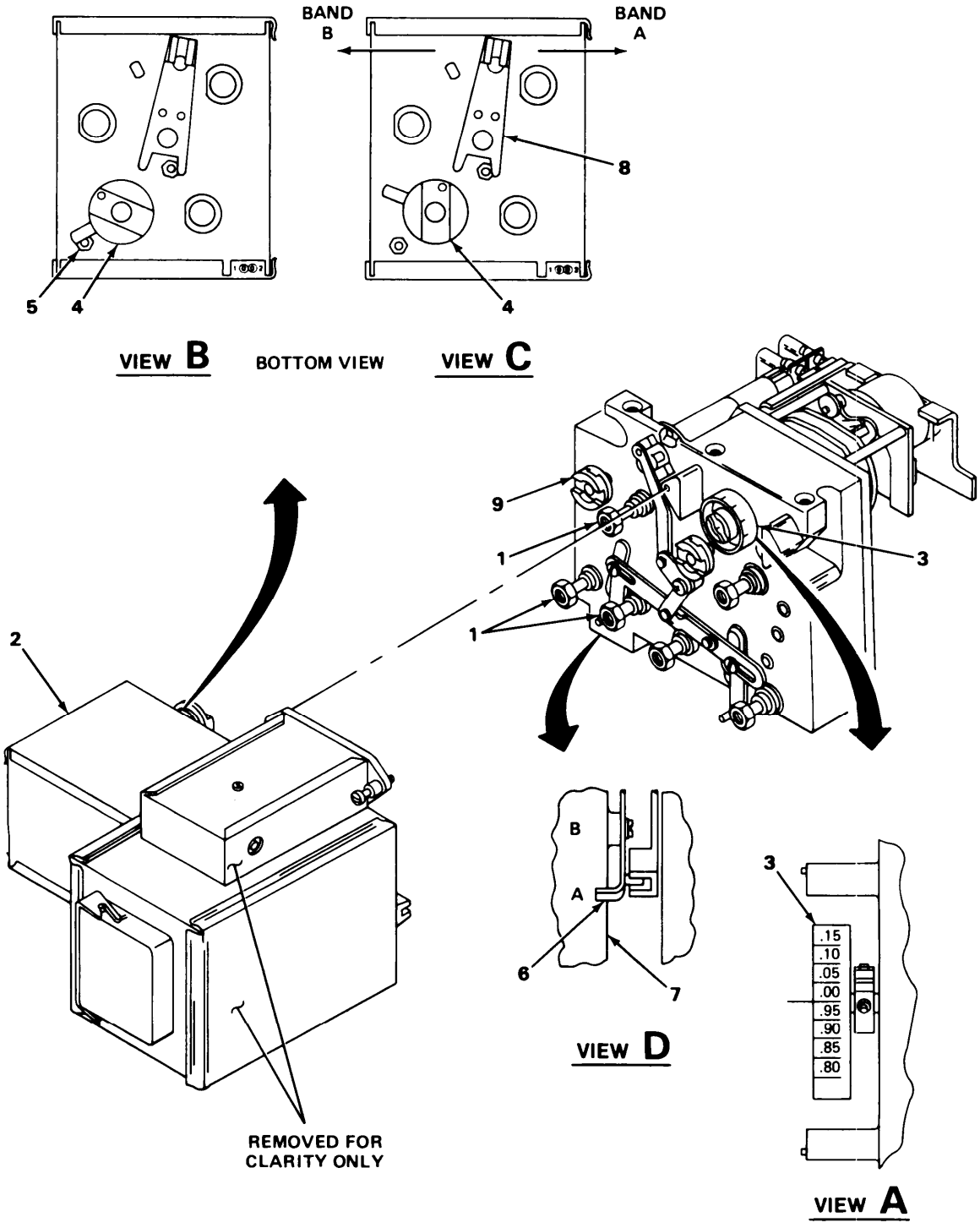
Coupler (4) may have to be turned slightly to mate with coupler (9).

7. Using wrench, tighten three captive nuts (1).

FOLLOW-ON MAINTENANCE: Install A1000, A2000, A6000, and A9700 assembly (para 2-67).

2-69. A6000 ASSEMBLY REPLACEMENT.

MATERIALS/PARTS: Oscillator buffer assembly, A6000 (P/N SMC619909)
PRELIMINARY PROCEDURE: Remove A1000, A2000, A6000, and A9700 assembly (para 2-67).



EL1AT066

2-69. A6000 ASSEMBLY REPLACEMENT. (CONT)

REMOVAL

1. Using wrench, loosen three captive nuts (1).
2. Remove A6000 assembly (2).

INSTALLATION

1. Turn dial (3) counterclockwise to position .00 setting as shown in view A.
2. Turn coupler (4) counterclockwise to stop (5) (view B).
3. Turn coupler (4) clockwise to position shown in view C.
4. Check pointer (6) on assembly which indicates band position of gearbox (7) (view D).
5. Move linkage arm (8) to band A or band B position indicated by pointer (6).
6. Position A6000 assembly (2) on captive nut towers and aline couplers (4 and 9), and linkage arm (8) and band switch cam (10).

NOTE

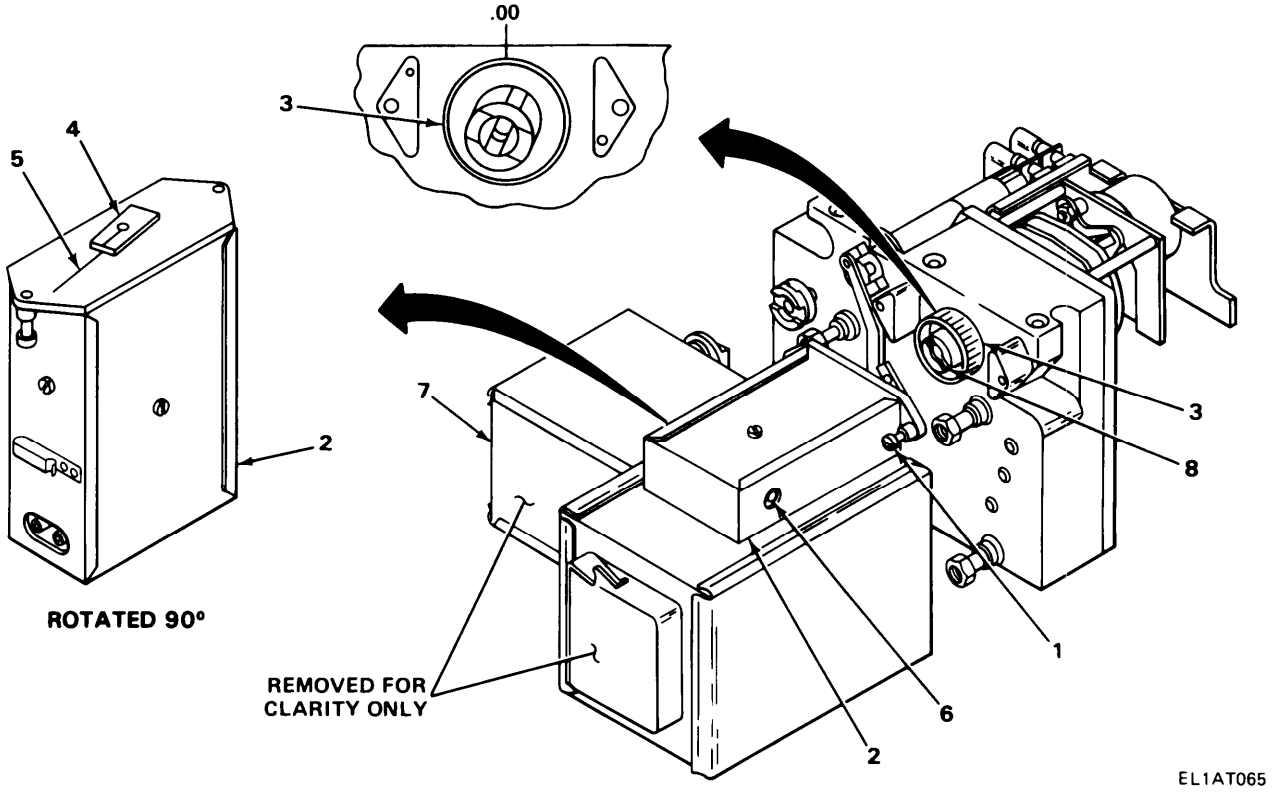
Coupler (4) may have to be turned slightly to mate with coupler (9).

7. Using wrench, tighten three captive nuts (1).

FOLLOW-ON MAINTENANCE: Install A1000, A2000, A6000, and A9700 assembly (para 2-67).

2-70. A2000 ASSEMBLY REPLACEMENT.

MATERIALS/PARTS: Oscillator, radio frequency, A2000 (P/N SMD414430)
PRELIMINARY PROCEDURE: Remove A1000, A2000, A6000, and A9700 assembly (para 2-67).



REMOVAL

Using screwdriver, loosen two captive screws (1) and remove A2000 assembly (2).

INSTALLATION

1. Turn dial (3) counterclockwise to .00 setting as shown in detailed view.
2. Aline coupler (4) with scribe mark (5).
3. Install A2000 assembly (2) with J2003 terminal (6) facing away from A6000 assembly (7).
4. Aline coupler (4) with mating coupler (8). Coupler (4) may have to be raised or turned slightly to mate with coupler (8).
5. Using screwdriver, tighten two captive screws (1).

FOLLOW-ON MAINTENANCE: Install A1000, A2000, A6000, and A9700 assembly (para 2-67).

2-71. A9700 ASSEMBLY REPLACEMENT.

MATERIALS/PARTS: Gearbox, A9700 (P/N SME619807)
PRELIMINARY PROCEDURE: Remove A1000, A2000, A6000, and A9700 assembly (para 2-67).

REMOVAL

NOTE

Gearbox A9700 is the end product when assemblies A1000, A2000, and A6000 are removed. See appropriate paragraphs for the removal of these assemblies.

INSTALLATION

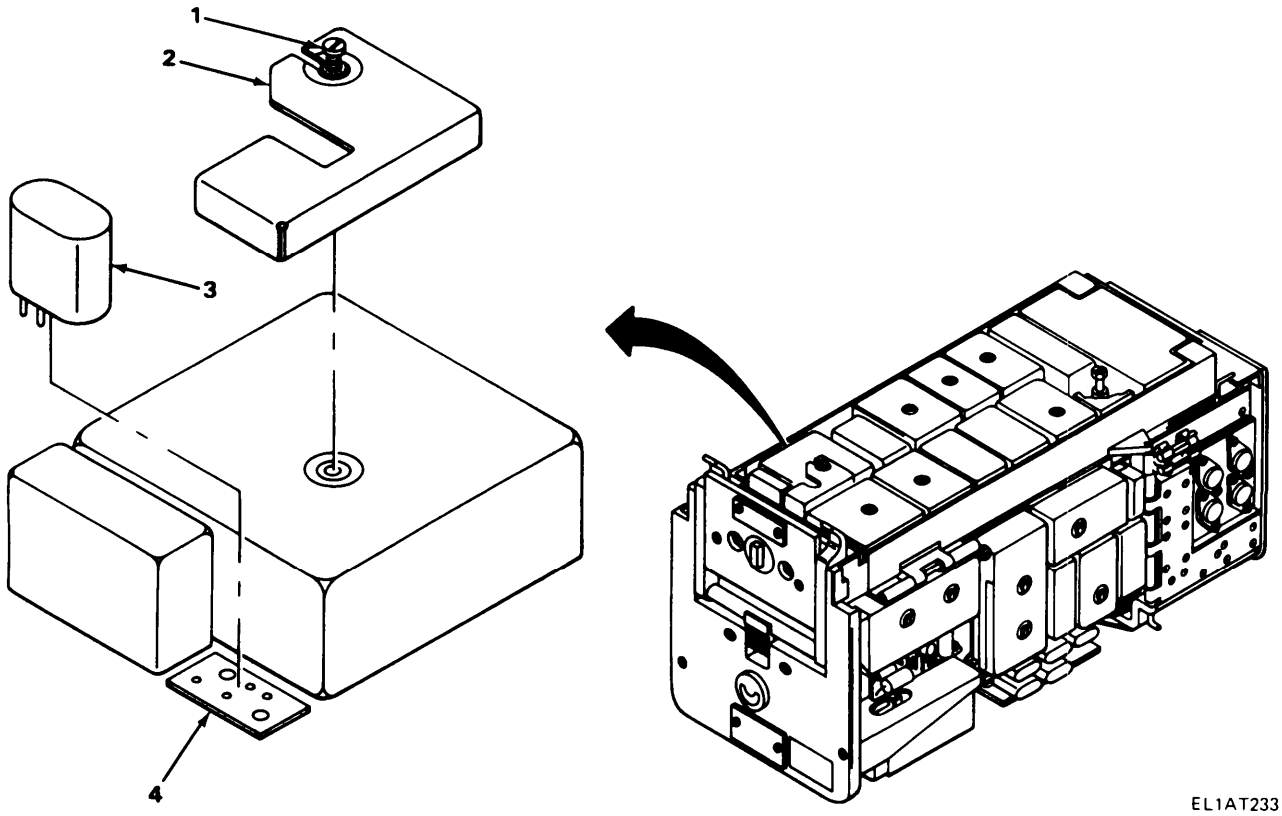
NOTE

Install assemblies A1000, A2000, and A6000 to gearbox A9700. See appropriate paragraphs for the installation of these assemblies.

FOLLOW-ON MAINTENANCE: Install A1000, A2000, A6000, and A9700 assembly (para 2-67).

2-72. RELAY K3001 REPLACEMENT.

MATERIALS/PARTS: Relay, K3001 (P/N SMD413526)
PRELIMINARY PROCEDURE: Remove case (para 2-39).



REMOVAL

1. Using screwdriver, loosen captive screw (1).
2. Remove retaining plate (2).
3. Pull relay (3) straight up from socket (4).

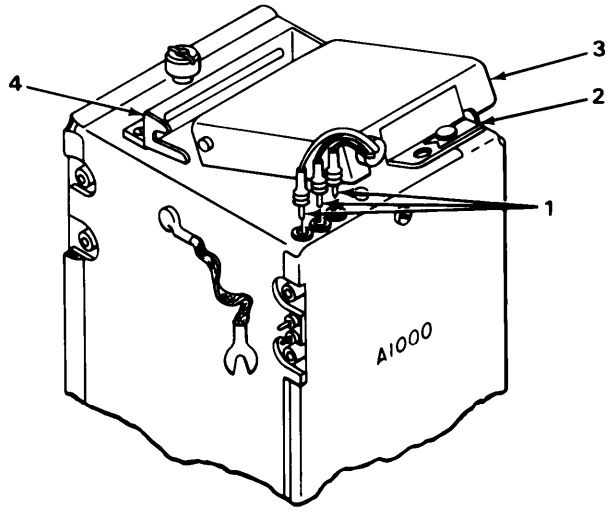
INSTALLATION

1. Position relay (3) in socket (4) and push into place.
2. Position retaining plate (2) under captive screw (1).
3. Using screwdriver, tighten captive screw (1).

FOLLOW-ON MAINTENANCE: Install case (para 2-39).

2-73. A1600 ASSEMBLY REPLACEMENT.

MATERIALS/PARTS: Power supply assembly, A1600 (P/N SMC416316)
PRELIMINARY PROCEDURE: Remove A6500 assembly (para 2-58).



EL1AT058

REMOVAL

NOTE

A1600 assembly is located on top of A1000 assembly.

1. Disconnect three color-coded wire plugs (1).
2. Unfasten retaining clip (2) by moving clip to right.
3. Lift front of assembly (3) and pull forward to remove from bracket (4).

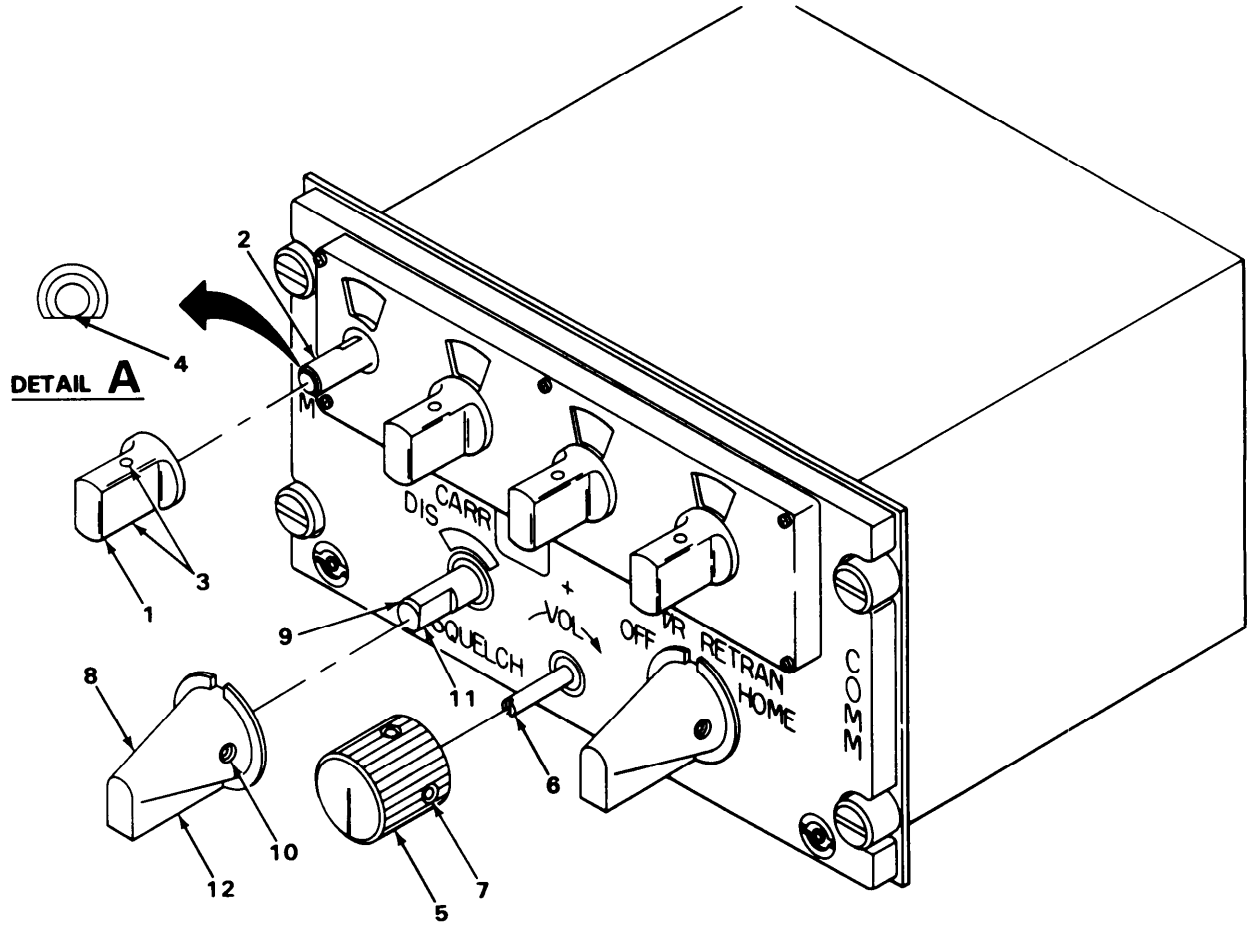
INSTALLATION

1. Place assembly (3) in bracket (4) and push into place.
2. Push front of assembly (3) down and secure by moving retaining clip (2) to left.
3. Connect three color-coded wire plugs (1).

FOLLOW-ON MAINTENANCE: Install A6500 assembly (para 2-58).

2-74. FRONT PANEL KNOBS REPLACEMENT.

MATERIALS/PARTS: Knob, frequency selector (P/N SMB620191)
Knob, squelch mode and mode control (P/N SMC620189)
Knob, volume control (P/N FNA1836-126-440)



EL1AT067

REMOVAL

NOTE

Step given is typical for the removal of all knobs.

Using hex wrench, loosen two setscrews and remove knob.

2-74. FRONT PANEL KNOBS REPLACEMENT. (CONT)

INSTALLATION

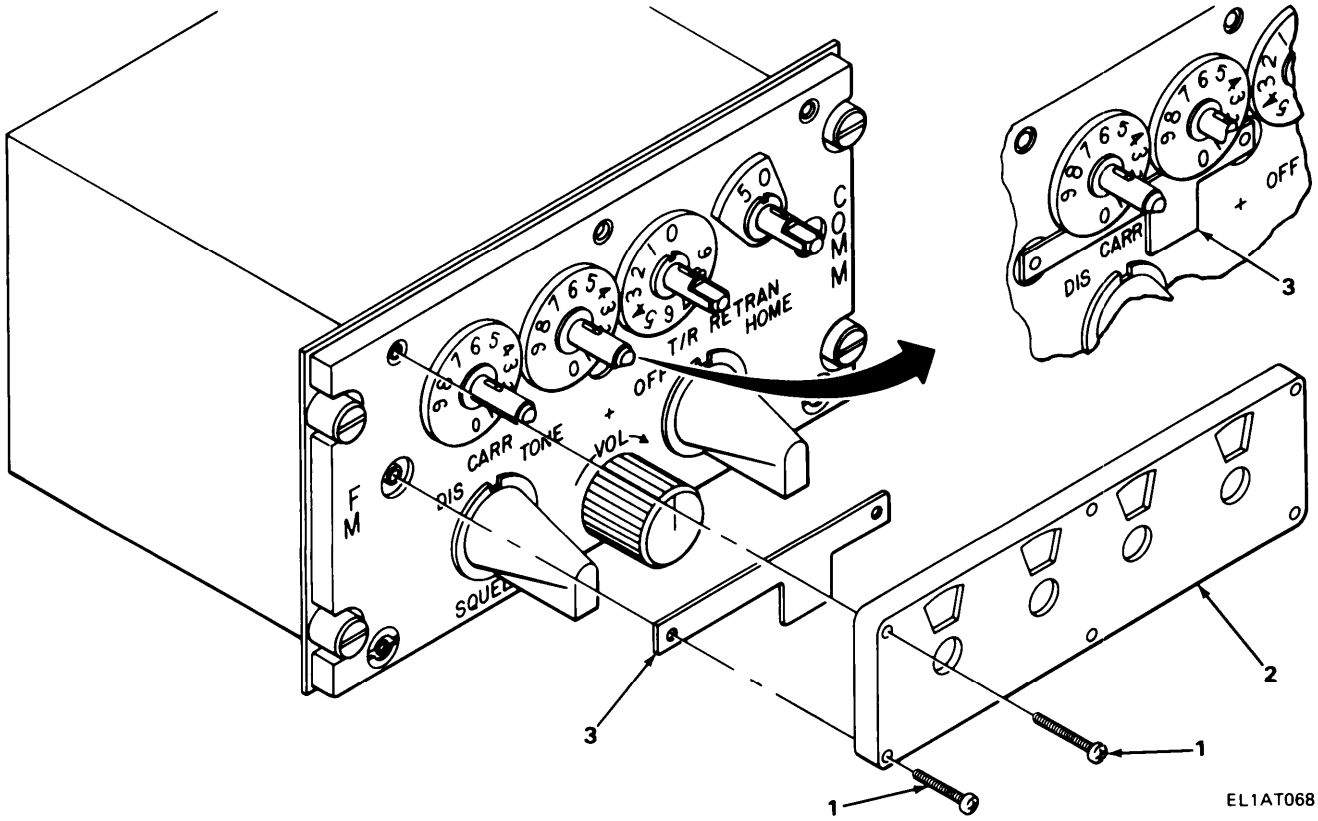
NOTE

For frequency selector knobs, do steps 1 and 2. For volume control knobs, do step 3. For squelch mode and mode control knobs, do steps 4 and 5.

1. Position knob (1) on switch shaft (2) and aline one of two setscrews (3) with flat (4) on switch shaft as shown in detailed view.
2. Using hex wrench, tighten two setscrews (3).
3. Position knob (5) on switch shaft (6) and, using hex wrench, tighten two setscrews (7).
4. Position knob (8) on switch shaft (9) and aline side setscrews (10) with flat (11) on switch shaft.
5. Using hex wrench, tighten side setscrew (10) and bottom setscrew (12).

2-75. FRONT PANEL DIAL MASK REPLACEMENT.

MATERIALS/PARTS: Mask, dial (P/N SMC620195)
PRELIMINARY PROCEDURE: Remove frequency selector knobs (para 2-74).



REMOVAL

Using screwdriver, remove six screws (1) and remove dial mask (2).

NOTE

Some control units may use a masking plate (3) to cover the squelch switch TONE display. Remove if used.

INSTALLATION

NOTE

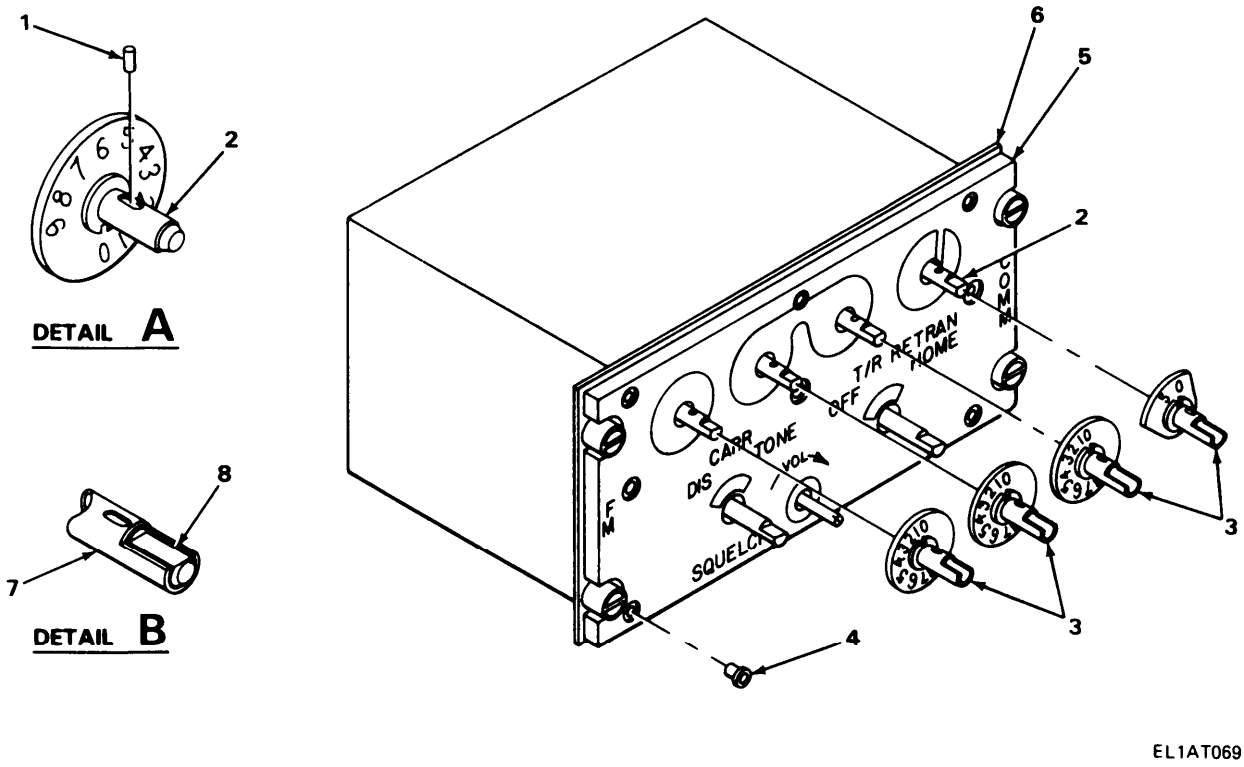
Some control units may use a masking plate (3) to cover the squelch switch TONE display. Install behind dials if used as shown in detailed view.

1. Position dial mask (2) on control unit and install six screws (1).
2. Using screwdriver, tighten six screws (1).

FOLLOW-ON MAINTENANCE: Install frequency selector knobs (para 2-74).

2-76. LIGHT PANEL REPLACEMENT.

MATERIALS/PARTS: Panel, light (P/N SMD620232)
PRELIMINARY PROCEDURE: Remove dial mask (para 2-75).



EL1AT069

REMOVAL

1. Remove four roll pins (1) from four frequency selector switch shafts (2) as shown in detail A.
2. Remove four shaft dials (3).
3. Using screwdriver, remove five panel mounting nuts (4) and remove light panel (5).

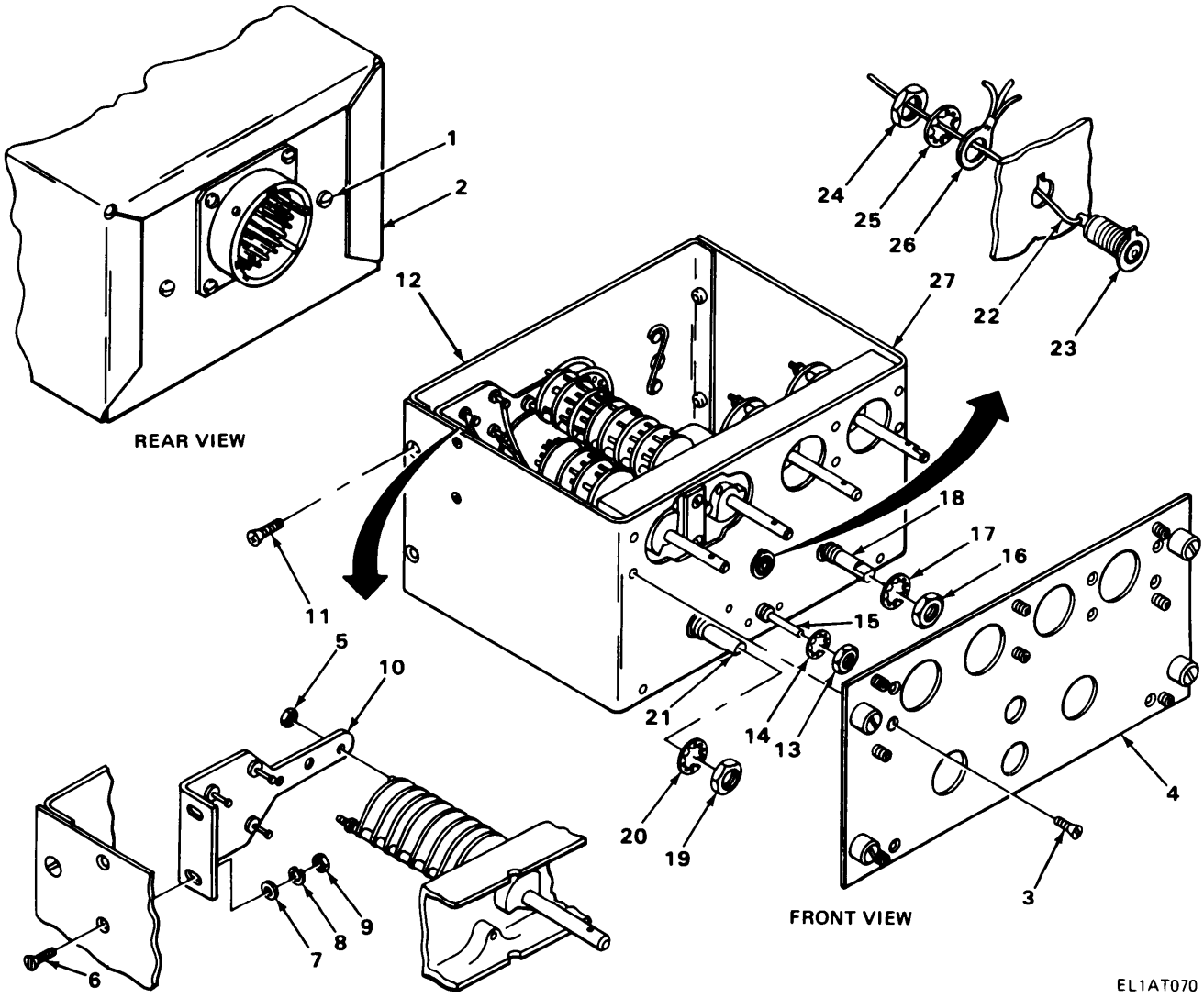
INSTALLATION

1. Position light panel (5) on control panel (6) and install five panel mounting nuts (4) and, using screwdriver, tighten nuts (4).
2. Install four shaft dials (3).
3. Aline shaft dial notch (7) with flat (8) on frequency selector switch shafts (2) as shown in detail B.
4. Install four roll pins (1) in four frequency selector switch shafts (2).

FOLLOW-ON MAINTENANCE: Install dial mask (para 2-75).

2-77. SWITCH AND WIRING ASSEMBLY REPLACEMENT.

PRELIMINARY PROCEDURE: Remove light panel (para 2-76).



REMOVAL

1. Using screwdriver, loosen two turn-lock fasteners (1) and remove cover (2).

NOTE

Some models may use two plastic insulator sheets to cover internal parts. Remove if used.

2. Using screwdriver, remove eight screws (3) from control panel (4).
3. Remove control panel (4).
4. Using wrench, remove two nuts (5) from end of switch S9102.

2-77. SWITCH AND WIRING ASSEMBLY REPLACEMENT. (CONT)

5. Using screwdriver and wrench, remove two screws (6), flat washers (7), Iockwashers (8), and nuts (9).
6. Move bracket (10) out of the way.
7. Using screwdriver, remove four screws (11) from end plate (12).
8. Using wrench, remove nut (13) and IT Iockwasher (14) from volume switch (15).
9. Using wrench, remove nut (16) and IT Iockwasher (17) from mode switch (18).
10. Using wrench, remove nut (19) and IT Iockwasher (20) from squelch switch (21).
11. Unsolder red wire (22) from electrical connector (23).
12. Using wrench, remove nut (24), IT Iockwasher (25), and ground lug (26).
13. Reinstall IT Iockwasher (25) and nut (24) on electrical connector (23) to prevent loss.
14. Remove switch and wiring assembly from U bracket (27).

INSTALLATION

1. Remove nut (24) and IT Iockwasher (25) from electrical connector (23).
2. Position U bracket (27) on switch and wiring assembly.

NOTE

Ensure tab on electrical connector is positioned in hole on U bracket as shown in detailed view.

3. Install ground lug (26), IT Iockwasher (25), and nut (24) and, using wrench, tighten nut (24).
4. Solder red wire (22) to center of electrical connector (23).

NOTE

When performing steps 4,5, and 6, ensure switch locating tab or tabs are in locating holes in U bracket.

5. Position squelch switch (21) in U bracket (27) and install IT Iockwasher (20) and nut (19) and, using wrench, tighten nut (19).
6. Position mode switch (18) in U bracket (27) and install IT Iockwasher (17) and nut (16) and, using wrench, tighten nut (16).
7. Position volume control switch (15) in U bracket (27) and install IT Iockwasher (14) and nut (13) and, using wrench, tighten nut (13).
8. Position bracket (10) on switch S9102 and install nuts (5) and, using wrench, tighten nuts (5).
9. Install two screws (6), flat washers (7), lockwashers (8), and nuts (9) through bracket (10) and side of U bracket (27) and, using screwdriver and wrench, tighten screws (6) and nuts (9).
10. Position end plate (12) on U bracket (27) and install four screws (11) and, using screwdriver, tighten screws (11).
11. Position control panel (4) on U bracket (27) and install eight screws (3) and, using screwdriver, tighten screws (3).

NOTE

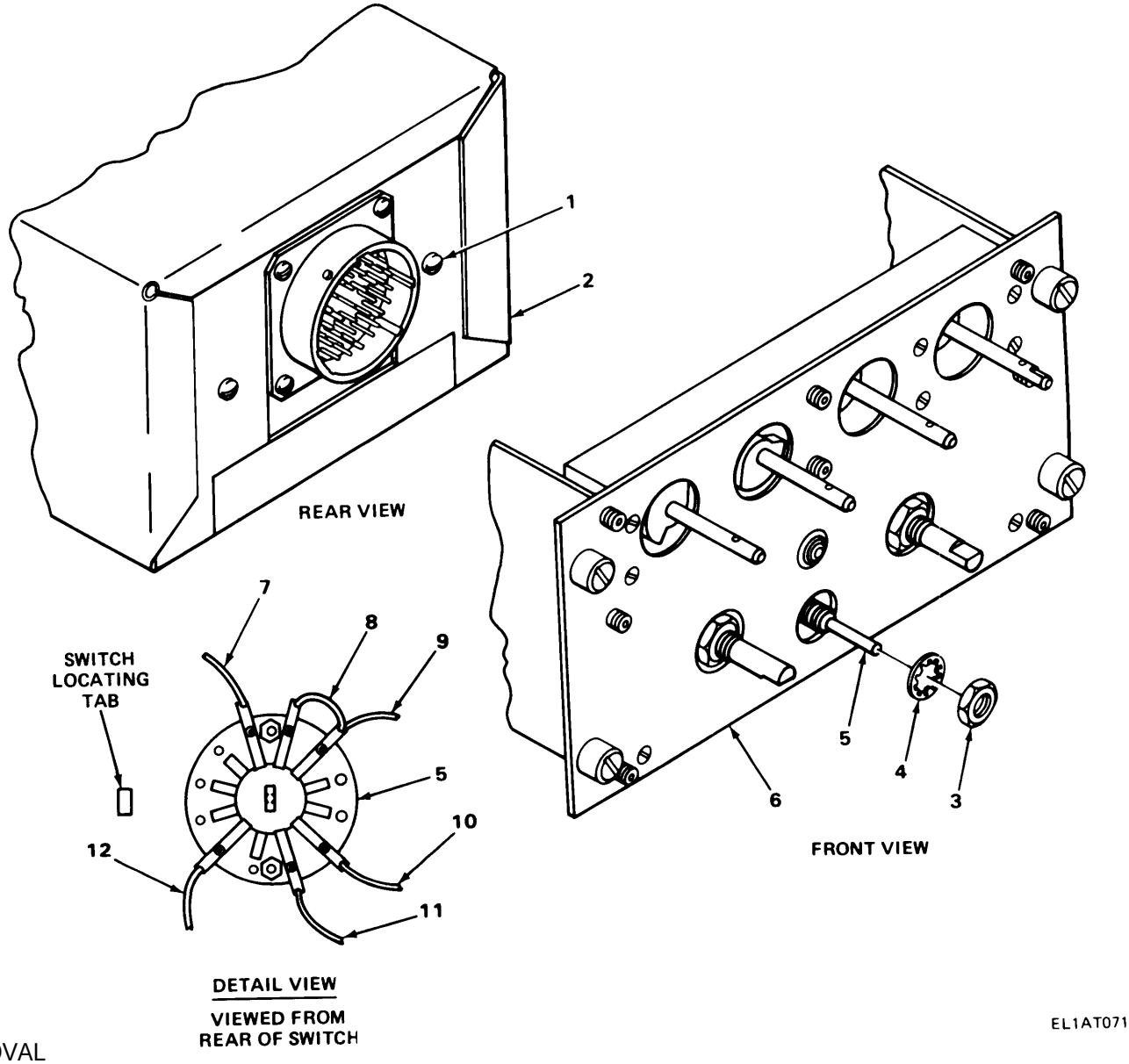
Replace two plastic insulator sheets if used.

12. Install cover (2) and, using screwdriver, tighten two turn-lock fasteners (1).

FOLLOW-ON MAINTENANCE: Install light panel (para 2-76).

2-78. SQUELCH SWITCH S9106 REPLACEMENT

MATERIALS/PARTS: Switch, rotary, S9106 (P/N SMC 620158)
PRELIMINARY PROCEDURE: Remove light panel (para 2-76).



REMOVAL

1. Using screwdriver, loosen two turn-lock fasteners (1) and remove cover (2).
2. Using wrench, remove nut (3) and IT lockwasher (4) and push switch (5) out of control panel (6).
3. Tag wires and unsolder from switch as shown in table below and as shown in detailed view.

2-78. SQUELCH SWITCH S9106 REPLACEMENT. (CONT)

WIRE COLOR	INDEX NO.
GRY	7
JUMPER	8
VIO	9
WHT/YEL	10
BLK	11
WHT/YEL	12

4. Remove switch (5).

INSTALLATION

1. Solder wires as shown in table above and detailed view and remove tags.

NOTE

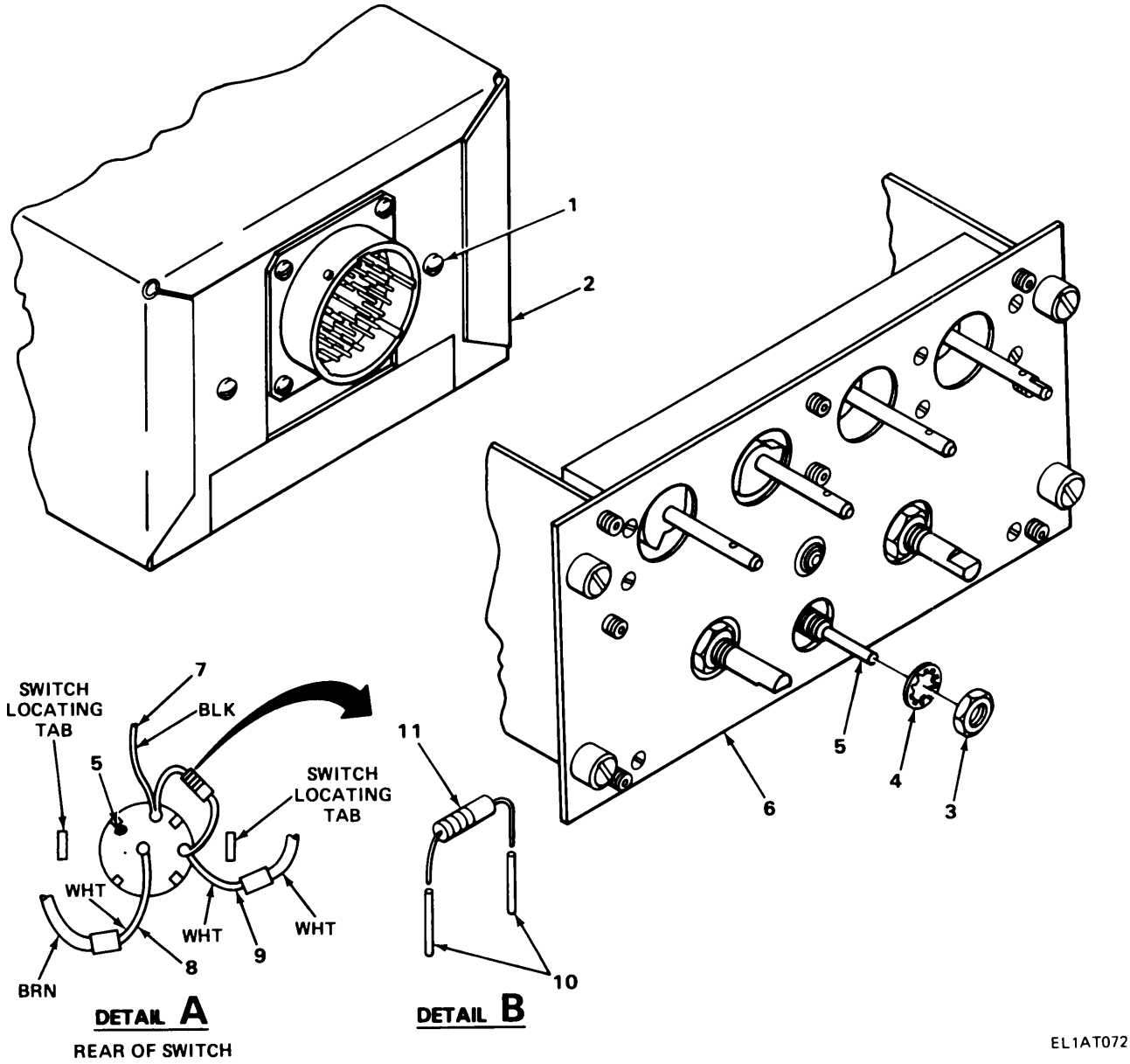
When performing next step, ensure locating tab on switch is positioned in locating hole behind control panel.

2. Position switch (5) in control panel (6) and install IT lockwasher (4) and nut (3) and, using wrench, tighten nuts (3).
3. Install cover (2) and, using screwdriver, tighten two turn-lock fasteners (1).

FOLLOW-ON MAINTENANCE: Install light panel (para 2-76).

2-79. VOLUME CONTROL SWITCH R9103 REPLACEMENT.

MATERIALS/PARTS: Resistor, fixed, composition (P/N RC07GF391J)
Resistor, variable, R9103 (P/N RV6NAYSD251C)
PRELIMINARY PROCEDURE: Remove light panel (para 2-76).



REMOVAL

1. Using screwdriver, loosen two turn-lock fasteners (1) and remove cover (2).
2. Using wrench, remove nut (3) and IT lockwasher (4) and push switch (5) out of control panel (6).
3. Unsolder one black wire (7), one white and brown wire (8), and one white and white wire (9) and remove switch (5).

2-79. VOLUME CONTROL SWITCH R 9103 REPLACEMENT. (CONT)

NOTE

Discard attached resistor along with defective switch.

INSTALLATION

NOTE

Before attempting to install switch in control panel, a specified value resistor must be soldered between terminals as shown in detail A.

Insulation must be installed on both wire leads of resistor prior to soldering (step 1).

1. Install insulation (10) on both wire leads of resistor (11) as shown in detail B.
2. Solder both wire leads of resistor (11) as shown in detail A.
3. Solder one white and white wire (9), one white and brown wire (8), and one black wire (7) to switch (5).

NOTE

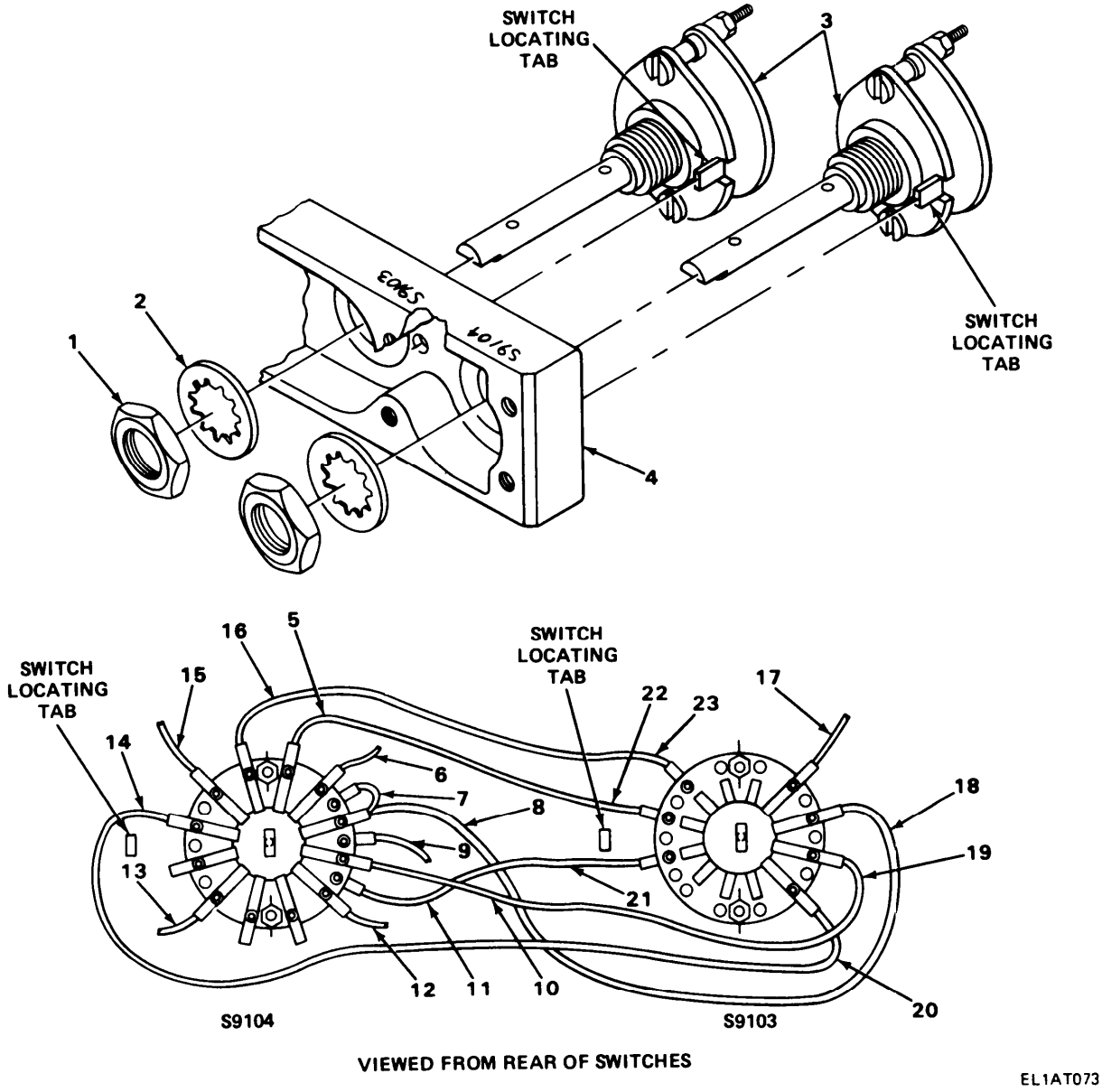
When performing next step ensure locating tab on switch is in locating hole behind control panel.

4. Position switch (5) in control panel (6) and install IT lockwasher (4) and nut (3) and, using wrench, tighten nut (3).
5. Install cover (2) and, using screwdriver, tighten two turn-lock fasteners (1).

FOLLOW-ON MAINTENANCE: Install light panel (para 2-76).

2-80. TENTHS FREQUENCY SELECTOR SWITCH S9103 AND/OR HUNDREDTHS FREQUENCY SELECTOR SWITCH S9104 REPLACEMENT.

MATERIALS/PARTS: Switch, rotary, S9103 (PIN SMC 620162)
Switch, rotary, S9104 (PIN SMC 620163)
PRELIMINARY PROCEDURE: Remove switch and wiring assembly (para 2-77).



EL1AT073

2-80. TENTHS FREQUENCY SELECTOR SWITCH S9103 AND/OR HUNDREDTHS FREQUENCY SELECTOR SWITCH S9104 REPLACEMENT. (CONT)

SWITCH S9104		SWITCH S9103	
WIRE COLOR	INDEX NO.	WIRE COLOR	INDEX NO.
BLU	5	BLK	17
WHT/BLK/VIO	6	WHT	18
JUMPER	7	VIO	19
WHT	8	RED	20
WHT/BRN	9	YEL	21
VIO	10	BLU	22
YEL	11	BRN	23
WHT/RED/VIO	12		
WHT/BLU	13		
RED	14		
WHT/RED/GRY	15		
BRN	16		

REMOVAL

NOTE

To gain access to switch wire terminals it is recommended that both switches be removed from panel.

1. Using wrench, remove two nuts (1) and IT lockwashers (2) and carefully push both switches (3) from panel (4).

NOTE

Tag all wires with index numbers for location and description.

2. Unsolder wires from selected switch (3) as shown in table and illustration.
3. Remove switch (3).

INSTALLATION

NOTE

Position selected switch locating tab as shown in illustration. See FO-21 for complete wiring diagram.

1. Solder wires to selected switch (3) as shown in table and illustration.

NOTE

When performing next step, ensure switch locating tabs are in locating holes on panel.

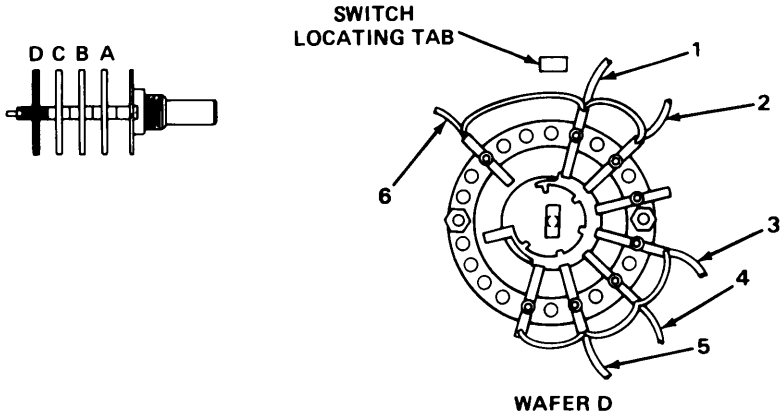
2. Position switches (3) in panel (4) and install two IT lockwashers (2) and nuts (1).
3. Using wrench, tighten nuts (1).

FOLLOW-ON MAINTENANCE: Install switch and wiring assembly (para 2-77).

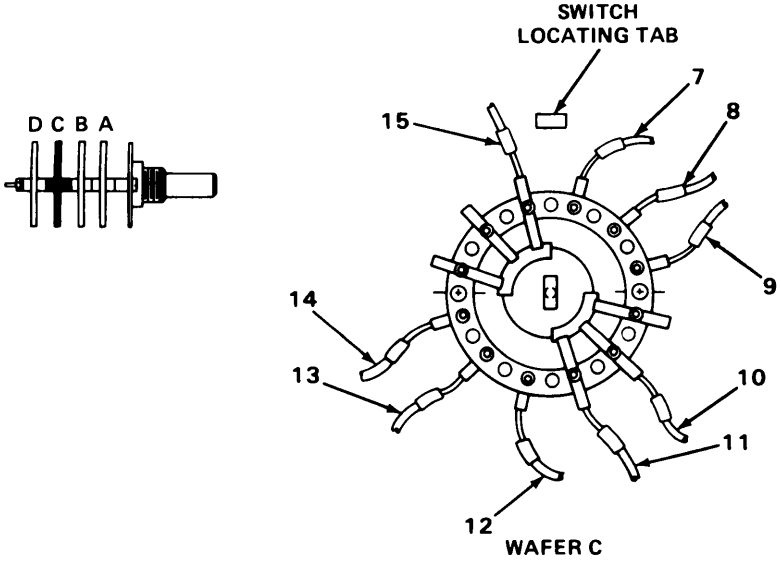
2-81. MODE SWITCH S9105 REPLACEMENT.

MATERIALS/PARTS: Diode, semiconductor, device, CR9101 (P/N JANIN645)
Resistor, fixed, composition, R9101 (P/N RC07GF273J)
Resistor, fixed, composition, R9102 (P/N RC07GF511J)
Resistor, fixed, composition, R9104 (P/N RC07GF120J)
Switch, rotary, S9105 (P/N SMC620159)

PRELIMINARY PROCEDURE: Remove switch and wiring assembly (para 2-77).



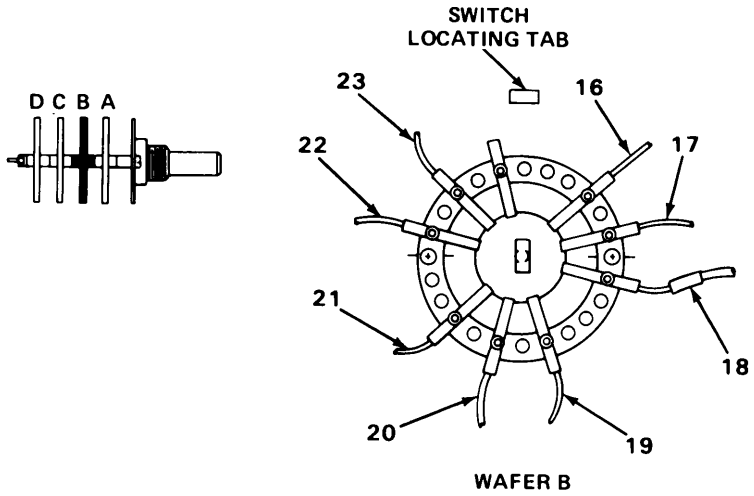
WIRE COLOR	INDEX NO.
RED	1
RED	2
WHT/RED	3
WHT/RED	4
WHT/RED	5
RED	6



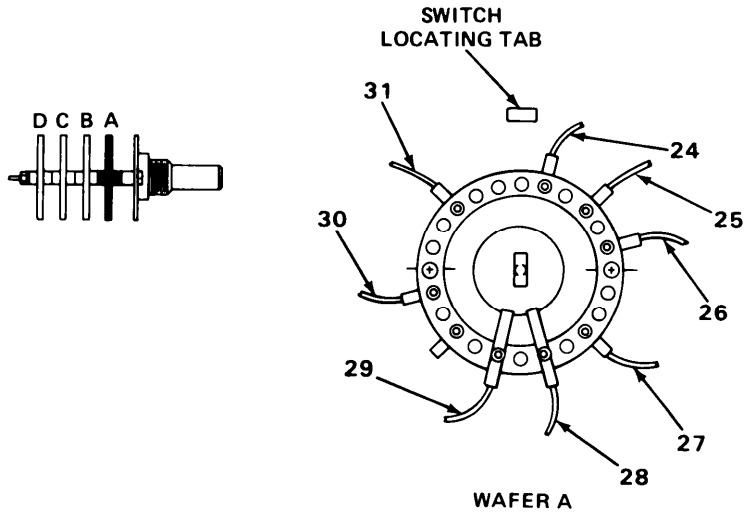
WIRE COLOR	INDEX NO.
WHT/RED	7
WHT/BRN	8
WHT/BRN	9
Y E L	10
WHT	11
WHT/GRY	12
BLK	13
WHT/YEL	14
WHT/BLK	15

EL1AT074

2-81. MODE SWITCH S9105 REPLACEMENT. (CONT)



WIRE COLOR	INDEX NO.
WHT/RED/GRY	16
WHT/RED/BLU	17
ORG	18
WHT/YEL/GRY	19
GRY	20
GRY	21
WHT/YEL/BRN	22
WHT/ORG/BRN	23



WIRE COLOR	INDEX NO.
WHT/BLU/GRY	24
WHT/ORG/YEL	25
WHT/BLK/BRN	26
WHT/VIO	27
WHT/BLU/BRN	28
WHT/YEL/VIO	29
WHT/ORG/BLK	30
BLK	31

EL1AT075

REMOVAL

NOTE

View from rear of switch. Position switch locating tab as shown in illustrations. Tag all wires with index numbers for location and description. Discard resistors and diode along with defective switch.

1. Unsolder wires as shown in illustrations.
2. Remove switch.

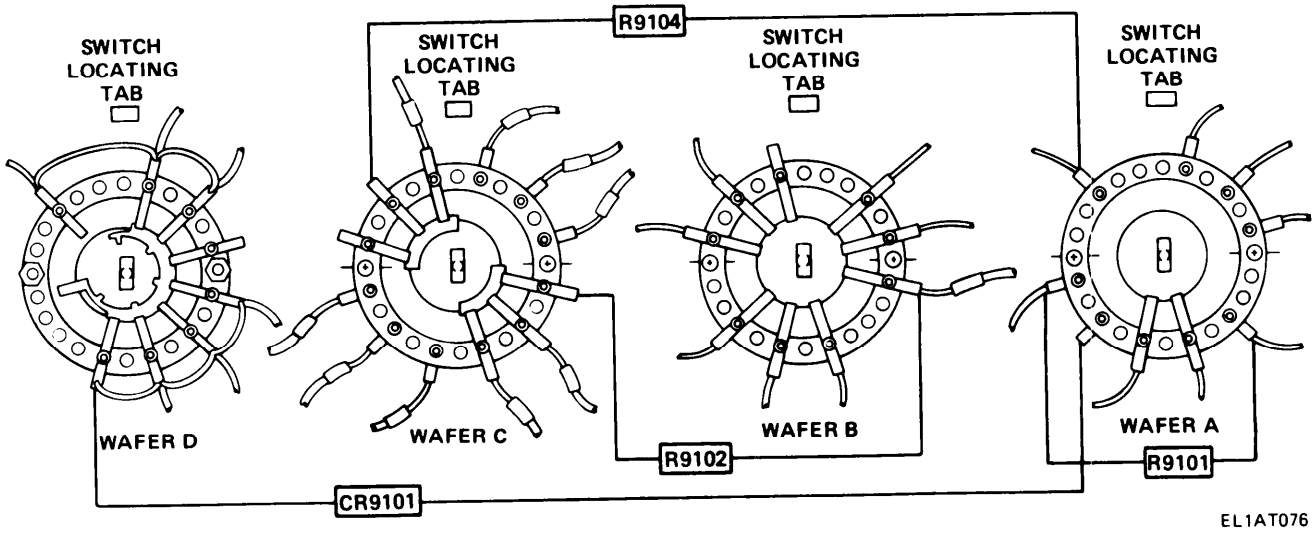
2-81. MODE SWITCH S9105 REPLACEMENT. (CONT)

INSTALLATION

NOTE

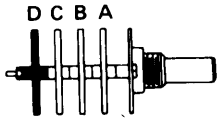
View from rear of switch.

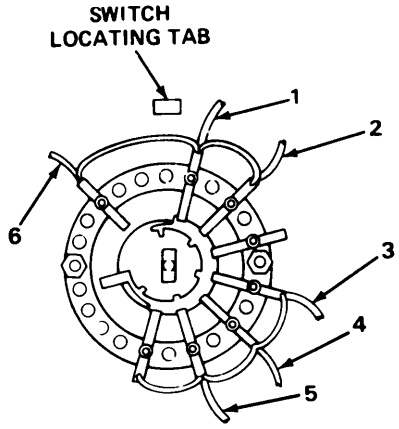
See FO-21 for complete wiring diagram.



Before soldering wires to switch, three resistors and one diode must first be soldered in place.

1. Solder resistors and diode as shown in illustration above.

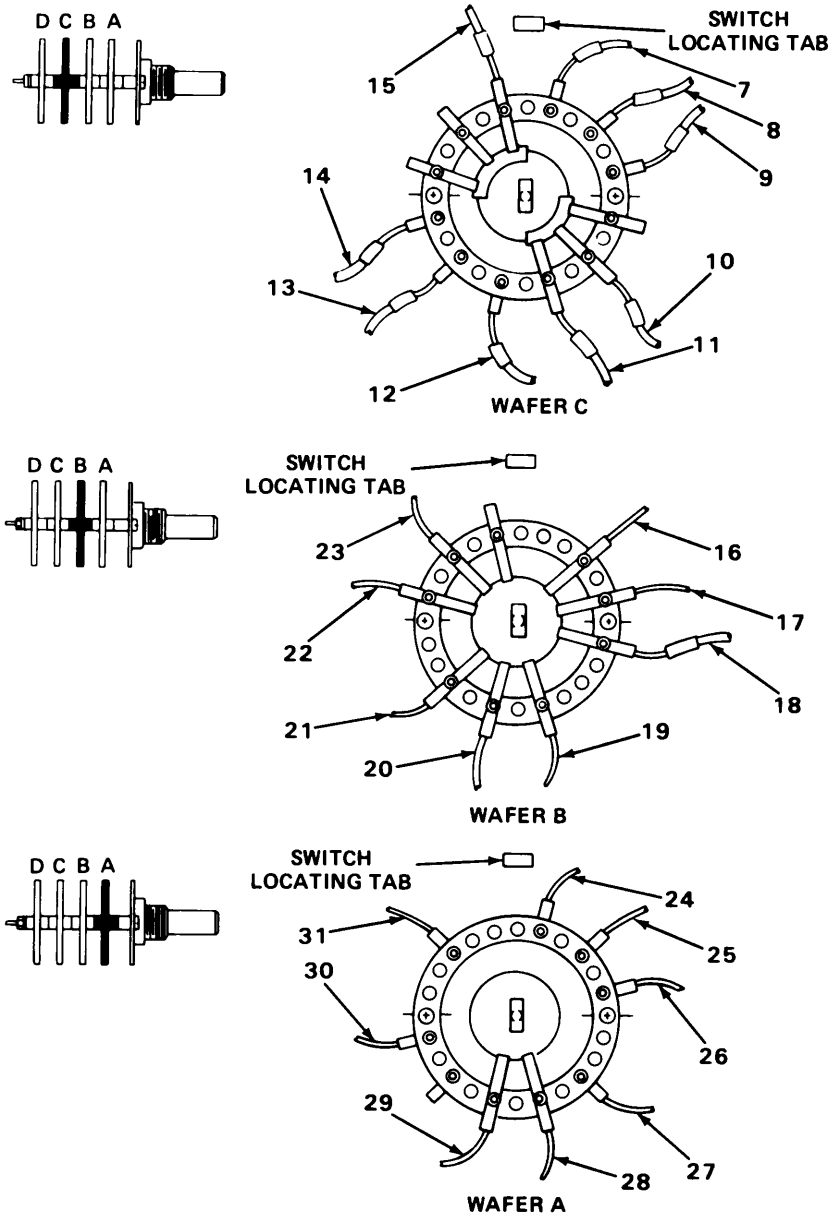




WIRE COLOR	INDEX NO.
RED	1
RED	2
WHT/RED	3
WHT/RED	4
WHT/RED	5
RED	6

EL1AT077

2-81. MODE SWITCH S9105 REPLACEMENT. (CONT)



WIRE COLOR	INDEX NO.
WHT/RED	7
WHT/BRN	8
WHT/BRN	9
YEL	10
WHT	11
WHT/GRY	12
BLK	13
WHT/YEL	14
WHT/BLK	15

WIRE COLOR	INDEX NO.
WHT/RED/GRY	16
WHT/RED/BLU	17
ORG	18
WHT/YEL/GRY	19
GRY	20
GRY	21
WHT/YEL/BRN	22
WHT/ORG/BRN	23

WIRE COLOR	INDEX NO.
WHT/BLU/GRY	24
WHT/ORG/YEL	25
WHT/BLK/BRN	26
WHT/VIO	27
WHT/BLU/BRN	28
WHT/YEL/VIO	29
WHT/ORG/BLK	30
BLK	31

EL1AT078

2. Solder wires as shown in illustration tables.
3. Remove all tags from wires.

FOLLOW-ON MAINTENANCE: Install switch and wiring assembly (para 2-77).

2-82. ELECTRICAL CONNECTOR J910I REPLACEMENT.

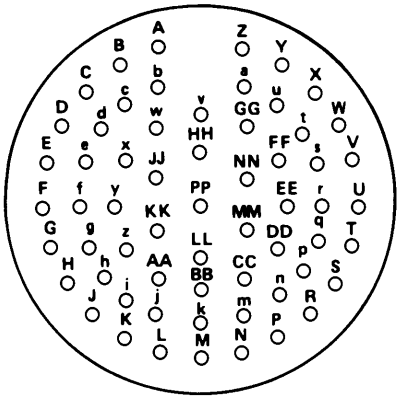
MATERIALS/PARTS: Connector, receptacle, electrical (P/N MS3112E24-61P)
PRELIMINARY PROCEDURE: Remove switch and wiring assembly (para 2-77).

PIN NO.	WIRE COLOR
A*	WHT & WHT/RED
B*	WHT & WHT/YEL
C	RED
D	RED
E	RED
F	WHT/RED
G	WHT/BLK/ORG
H	WHT/ORG
J	WHT/RED/GRN
K	NOT USED
L	WHT/GRN/BLU
M	WHT/RED/ORG
N*	WHT/BLK
P	WHT/ORG/GRY
R	WHT/BLU
S	WHT/ORG/VIO
T	WHT/BLK/ORG
U	WHT/BRN/GRY
V	WHT/YEL
W	NOT USED
X	WHT/BRN/BLU
Y	VIO
Z	BLK

PIN NO.	WIRE COLOR
a	RED
b	BLK
c*	WHT & ORG
d*	WHT & WHT/BLK
e	WHT/RED
f	WHT/RED
9	WHT/ORG/GRN
h	NOT USED
i	NOT USED
j	WHT/BL K/G RN
k	WHT/BRN/VIO
m	WHT/ORG/BLU
n	NOT USED
p	NOT USED
q	WHT/BLU/GRY
r	NOT USED
s	WHT/RED/BLU
t	WHT/RED/GRY
u	WHT/BLK/BRN
v	WHT/ORG/YEL
w*	WHT & GRY
x*	WHT & WHT
y*	WHT & YEL
z	WHT/BRN/GRN

PIN NO.	WIRE COLOR
AA	WHT/GRN
BB	WHT/BLK/GRY
CC	WHT/BLK/RED
DD	WHT/BLK/ORG
EE	NOT USED
FF	WHT/GRY/YEL
GG	WHT/VIO
HH	GRY
JJ*	NHT & WHT/BRN
KK*	WHT & BLK
LL	WHT/RED/VIO
M M	WHT/YEL/BRN
N N	WHT/ORG/BRN
PP*	WHT & WHT/GRY

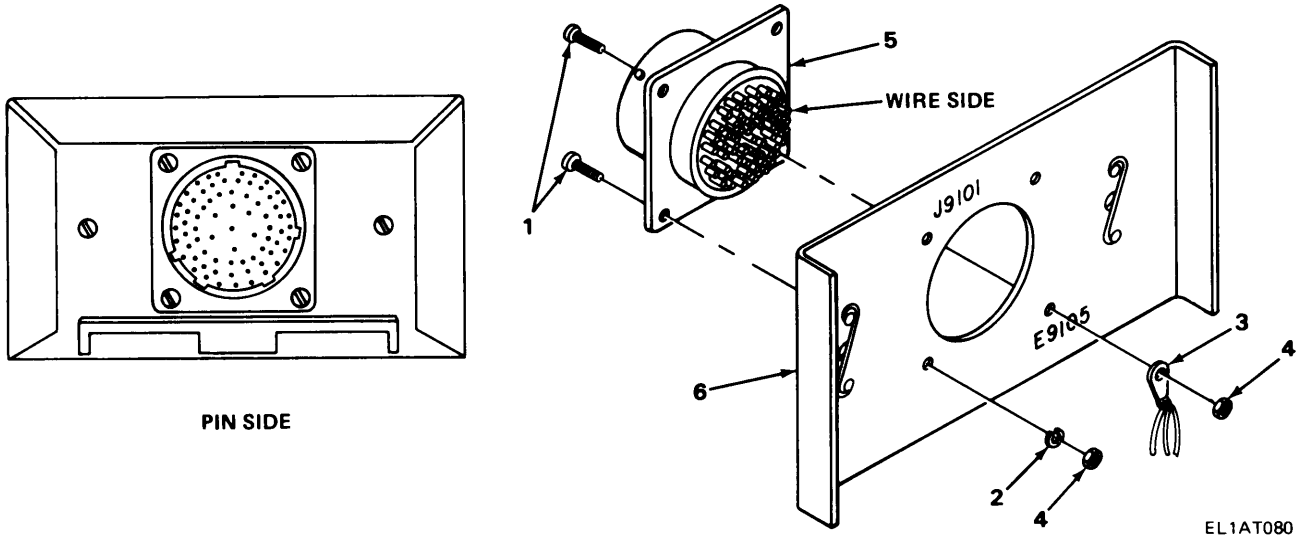
* TWO INDIVIDUAL WIRES OF DIFFERENT GAGES ARE JOINED TOGETHER AND COVERED WITH BROWN HEAT SHRINK TUBING. SOME MAY HAVE BLACK JUMPER WIRES ATTACHED AT JOINT.



VIEWED FROM WIRE SIDE OF CONNECTOR J9101

EL1AT079

2-82. ELECTRICAL CONNECTOR J9101 REPLACEMENT. (CONT)



REMOVAL

NOTE

Tag all wires with connector pin letters. See table to verify wire color with connector pin letter.

1. Unsolder wires from connector.
2. Using screwdriver and wrench, remove four screws (1), lockwashers (2), ground lug (3), and nuts (4).
3. Remove connector (5) from bracket (6).

INSTALLATION

1. Position connector (5) in bracket (6) as shown in detailed view.
2. install four screws (1), lockwashers (2), ground lug (3), and nuts (4).
3. Using screwdriver and wrench, tighten screws (1) and nuts (4).

NOTE

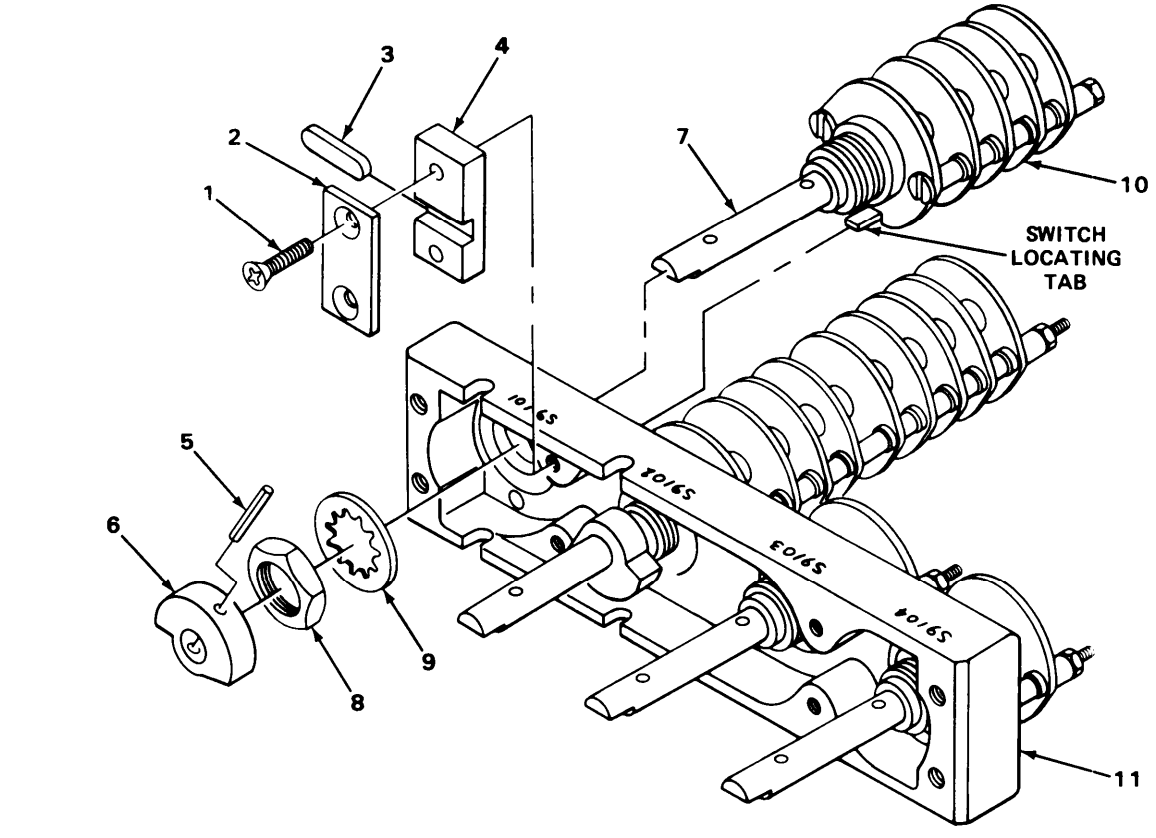
When performing next step, start from center of connector and work out. Use table to verify wire color to connector pin letter. See FO-21 for complete wiring diagram.

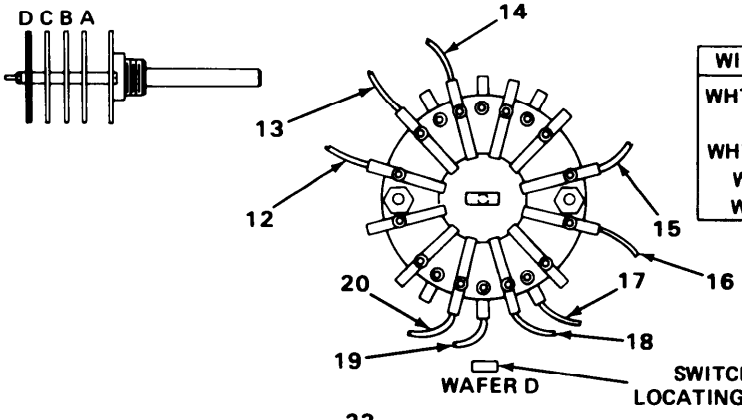
4. Solder wires to connector.
5. Remove tags.

FOLLOW-ON MAINTENANCE: Install switch and wiring assembly (para 2-77).

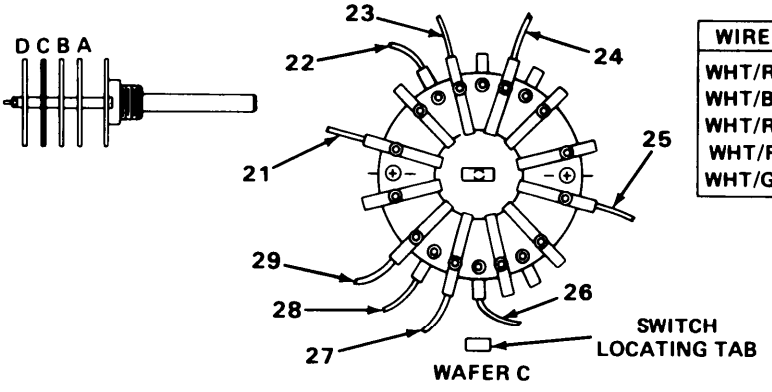
2-83. TENS FREQUENCY SELECTOR SWITCH S910I REPLACEMENT.

MATERIALS/PARTS: Switch, rotary, S9101 (P/N SMC620160)
PRELIMINARY PROCEDURE: Remove switch and wiring assembly (para 2-77).





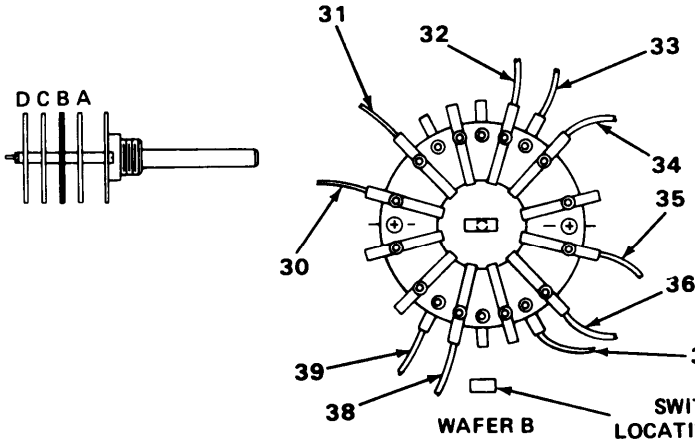
WIRE COLOR	INDEX NO.	WIRE COLOR	INDEX NO.
WHT/BRN/GRN	12	WHT/GRN/RED	17
BLK	13	WHT/BLK/RED	18
WHT/BLK/BRN	14	WHT/RED	19
WHT/YEL	15	WHT/BLK	20
WHT/GRN	16		



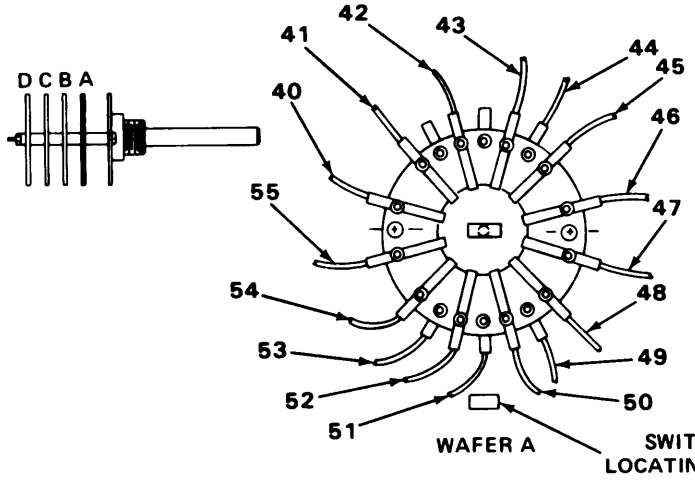
WIRE COLOR	INDEX NO.	WIRE COLOR	INDEX NO.
WHT/RED/ORG	21	WHT/YEL/BRN	26
WHT/BLK/GRN	22	WHT/BRN/GRY	27
WHT/RED/GRY	23	WHT/RED/GRY	28
WHT/RED/VIO	24	WHT/YEL/VIO	29
WHT/GRN/BLU	25		

EL1AT081

2-83. TENS FREQUENCY SELECTOR SWITCH S9101 REPLACEMENT. (CONT)



WIRE COLOR	INDEX NO.	WIRE COLOR	INDEX NO.
WHT/BLK/GRY	30	WHT/RED/VIO	35
VIO	31	GRY	36
WHT/RED	32	WHT/RED/YEL	37
WHT/RED/GRN	33	WHT/BRN	38
WHT/GRN	34	WHT/BLK/ORG	39



WIRE COLOR	INDEX NO.	WIRE COLOR	INDEX NO.
WHT/BRN/VIO	40	BLU	48
GRN	41	WHT/BLU/GRY	49
WHT/GRY	42	WHT/ORG	50
ORG	43	WHT/GRN/GRY	51
WHT	44	BRN	52
WHT/VIO	45	WHT/BRN/RED	53
YEL	46	WHT/BLU	54
WHT/ORG/BLU	47	RED	55

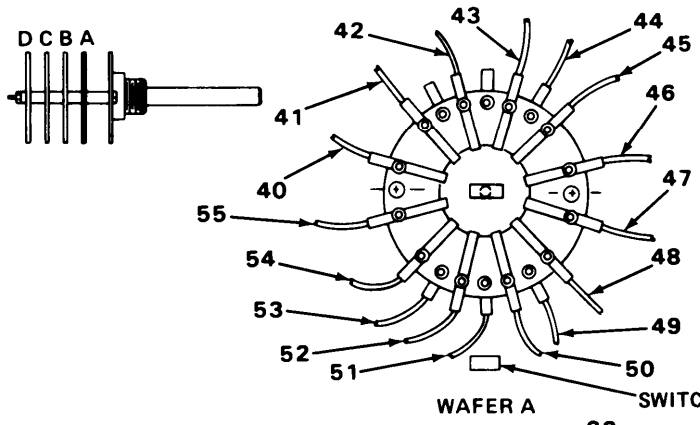
NOTE

View from rear of switch. Position switch locating tab as shown in illustrations. Tag all wires with index numbers for location and description.

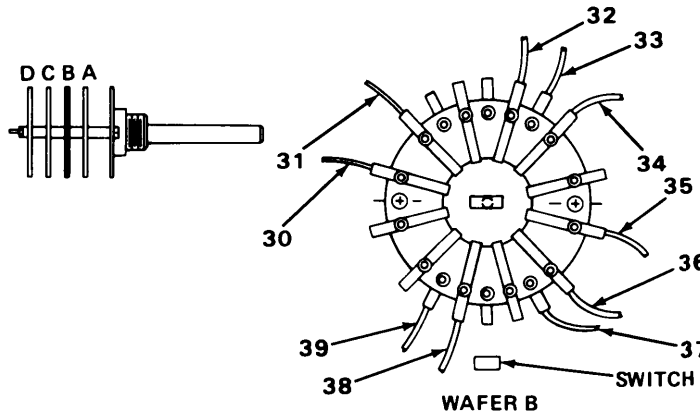
REMOVAL

1. Using screwdriver, remove two screws (1), retaining plate (2), cam stop (3), and cam stop guide (4).
2. Remove roll pin (5) from cam (6) and slide cam off switch stem (7).
3. Using wrench, remove nut (8) and IT Iockwasher (9) and carefully push switch (10) away from panel (11).
4. Starting from wafer D, unsolder all wires as shown in illustrations and tables.
5. Remove switch (10).

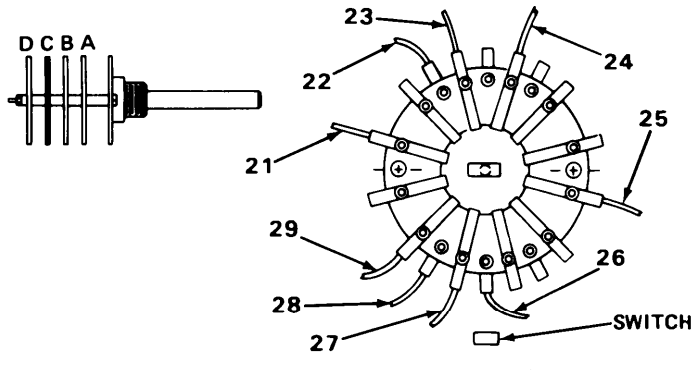
2-83. TENS FREQUENCY SELECTOR SWITCH S9101 REPLACEMENT. (CONT)



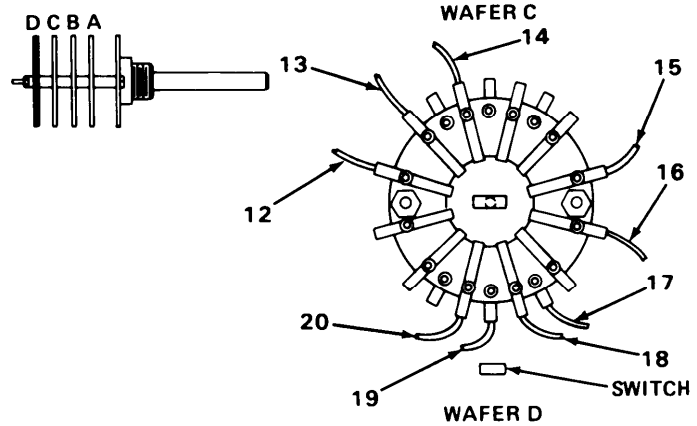
WIRE COLOR	INDEX NO.	WIRE COLOR	INDEX NO.
WHT/BRN/VIO	40	BLU	48
GRN	41	WHT/BLU/GRY	49
WHT/GRY	42	WHT/ORG	50
ORG	43	WHT/GRN/GRY	51
WHT	44	BRN	52
WHT/VIO	45	WHT/BRN/RED	53
YEL	46	WHT/BLU	54
WHT/ORG/BLU	47	RED	55



WIRE COLOR	INDEX NO.	WIRE COLOR	INDEX NO.
WHT/BLK/GRY	30	WHT/RED/VIO	35
VIO	31	GRY	36
WHT/RED	32	WHT/RED/YEL	37
WHT/RED/GRN	33	WHT/BRN	38
WHT/GRN	34	WHT/BLK/ORG	39



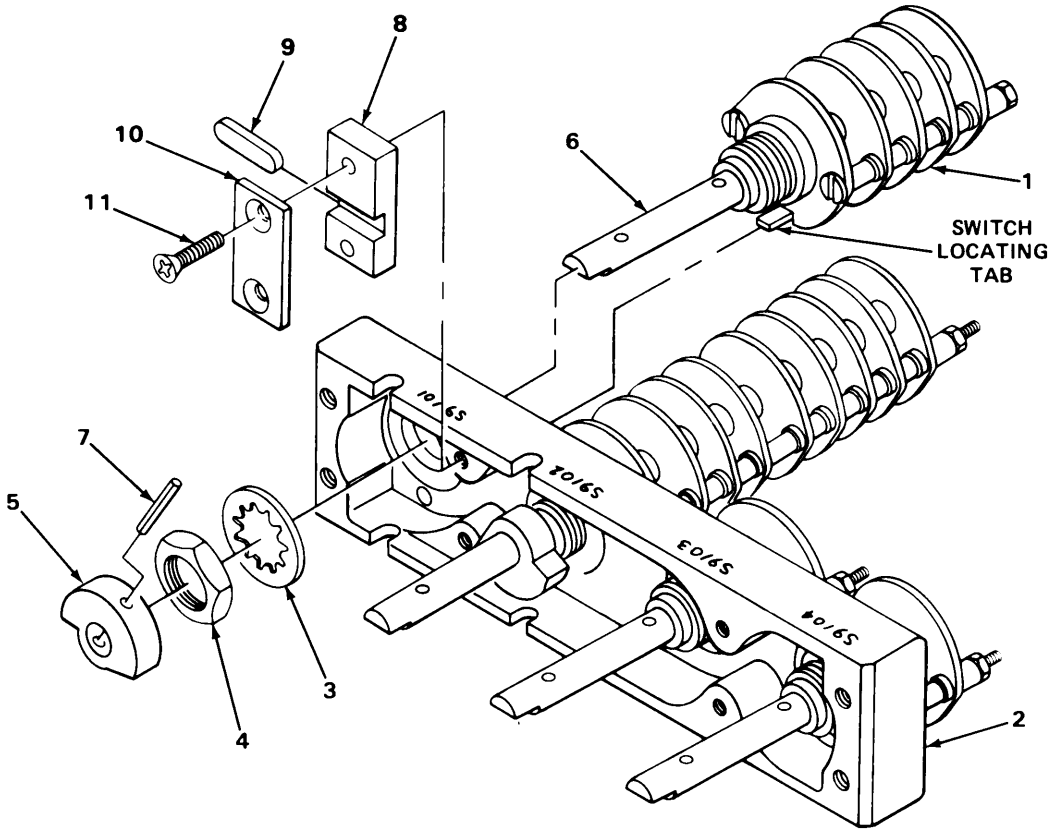
WIRE COLOR	INDEX NO.	WIRE COLOR	INDEX NO.
WHT/RED/ORG	21	WHT/YEL/BRN	26
WHT/BLK/GRN	22	WHT/BRN/GRY	27
WHT/RED/GRY	23	WHT/RED/GRY	28
WHT/RED/VIO	24	WHT/YEL/VIO	29
WHT/GRN/BLU	25		



WIRE COLOR	INDEX NO.	WIRE COLOR	INDEX NO.
WHT/BRN/GRN	12	WHT/GRN/RED	17
BLK	13	WHT/BLK/RED	18
WHT/BLK/BRN	14	WHT/RED	19
WHT/YEL	15	WHT/BLK	20
WHT/GRN	16		

EL1AT083

2-83. TENS FREQUENCY SELECTOR SWITCH S9101 REPLACEMENT. (CONT)



INSTALLATION

1. Position switch (1) in panel (2) with switch locating tab in line with hole in panel.

NOTE

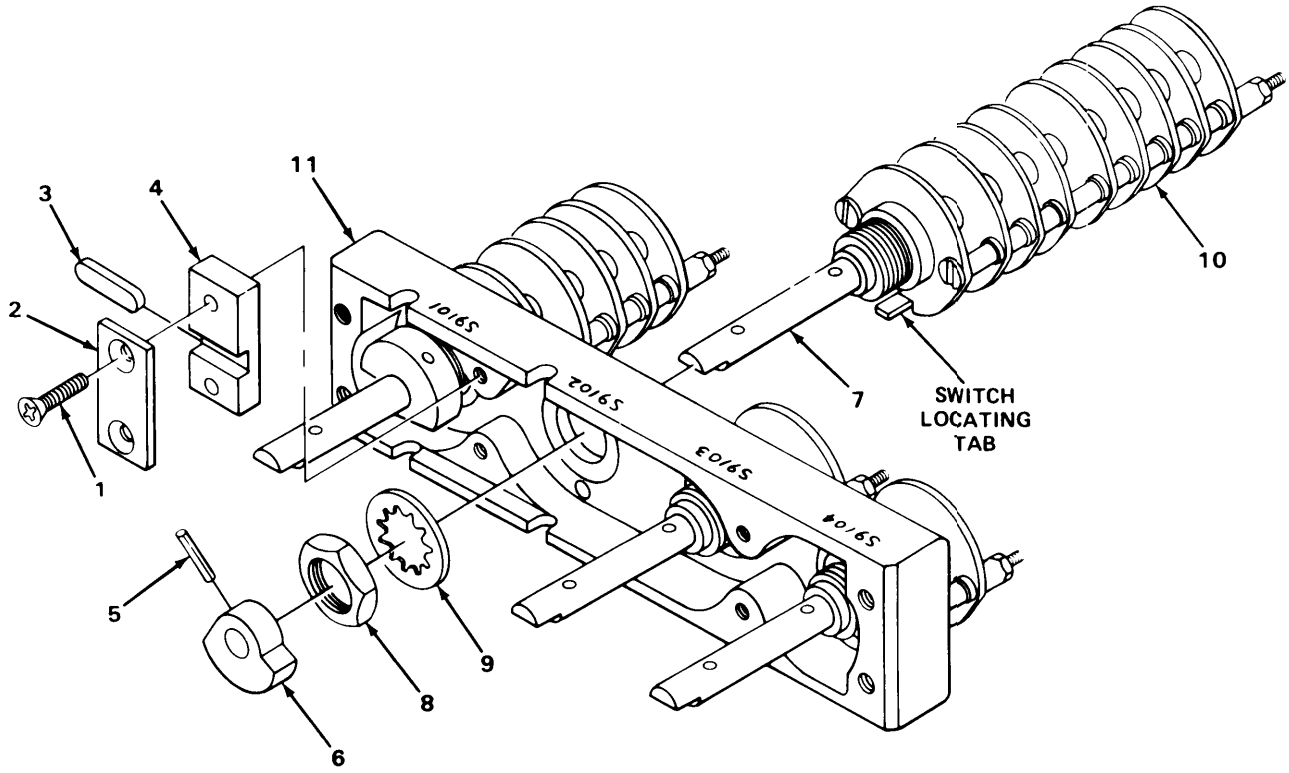
View from rear of switch. Position switch locating tab as shown in illustration. See FO-21 for complete wiring diagram.

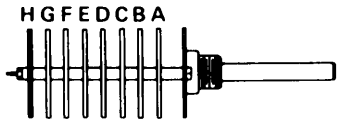
2. Starting from wafer A and using tags for reference, solder wires as shown in illustrations.
3. Position switch locating tab in hole in panel (2) and install IT lockwasher (3) and nut (4) and, using wrench, tighten nut (4).
4. Position cam (5) on switch stem (6) as shown in illustration and install roll pin (7).
5. Position cam stop guide (8) with larger area of guide toward top and install cam stop (9), retaining plate (10), and two screws (11).
6. Using screwdriver, tighten screws (11).

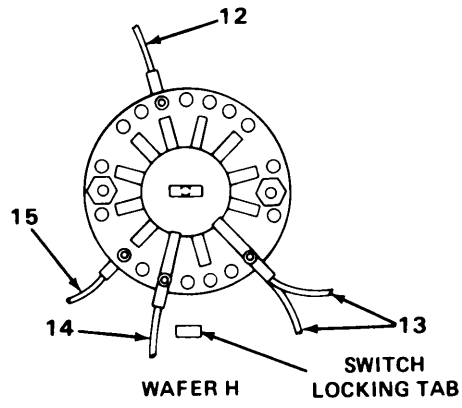
FOLLOW-ON MAINTENANCE: Install switch and wiring assembly (para 2-77).

2-84. UNITS FREQUENCY SELECTOR SWITCH S9102 REPLACEMENT.

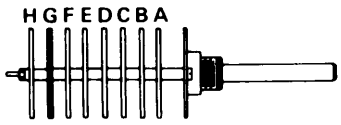
MATERIALS/PARTS: Switch, rotary, S9102 (P/N SMC-620161)
PRELIMINARY PROCEDURE: Remove switch and wiring assembly (para 2-77).

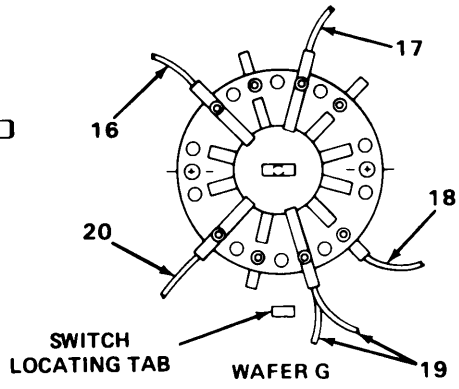






WIRE COLOR	INDEX NO.
WHT/BLU	12
WHT/RED/BRN	13
WHT	14
WHT/GRN/VIO	15

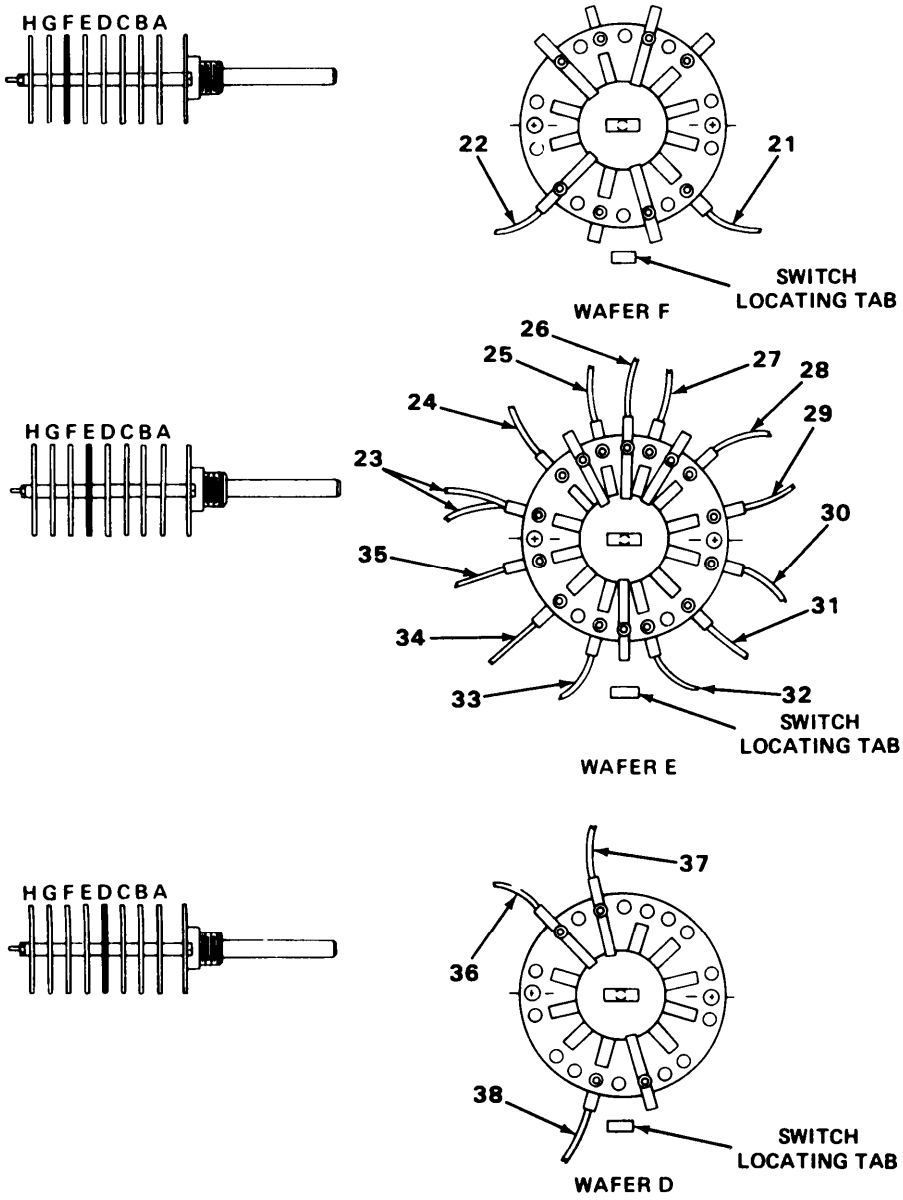




WIRE COLOR	INDEX NO.
WHT/RED/GRN	16
WHT/RED	17
WHT/RED	18
WHT/ORG/BLK	19
WHT/RED/YEL	20

EL1AT085

2-84. UNITS FREQUENCY SELECTOR SWITCH S9102 REPLACEMENT. (CONT)



WIRE COLOR	INDEX NO.
GRN	21
WHT/BRN	22

WIRE COLOR	INDEX NO.
BLK	23
GRY	24
VIO	25
ORG	26
BLU	27
GRN	28
WHT/RED	29
WHT/GRY	30
WHT/GRN	31
WHT/BLU	32
WHT/VIO	33
ORG	34
YEL	35

WIRE COLOR	INDEX NO.
WHT/RED/BLK	36
WHT/BRN/BLK	37
BLK	38

EL1AT086

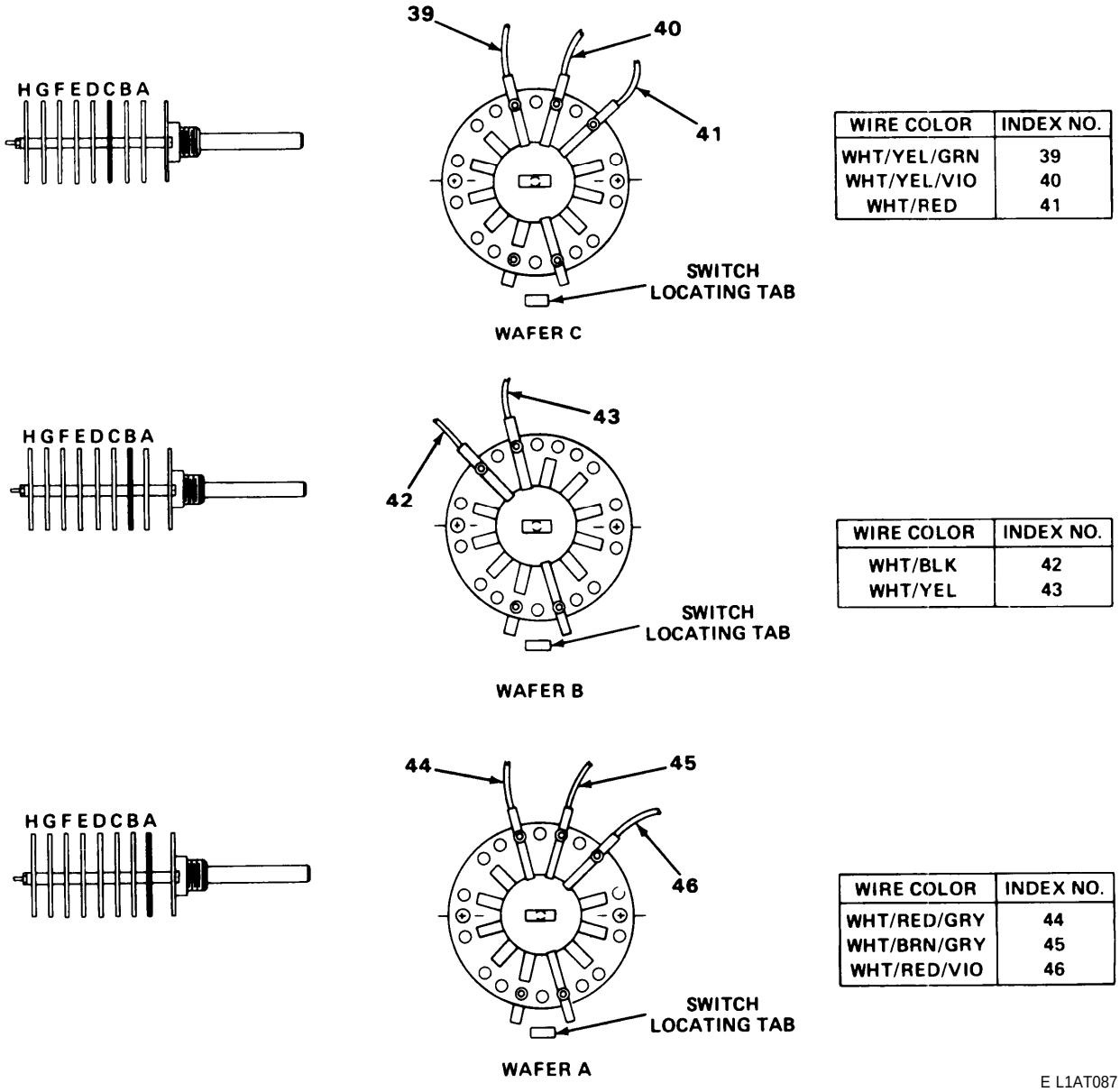
NOTE

View from rear of switch. Position switch locating tab as shown in illustrations. Tag all wires with index numbers for location and description.

1. Using screwdriver, remove two screws (1), retaining plate (2), cam stop (3), and cam stop guide (4).
2. Remove roll pin (5) from cam (6) and slide cam off switch stem (7).
3. Using wrench, remove nut (8) and IT Iockwashers (9) and carefully push switch (10) away from panel (11).
4. Starting from wafer H, unsolder wires as shown in illustrations through wafer D.

2-84. UNITS FREQUENCY SELECTOR SWITCH S9102 REPLACEMENT. (CONT)

REMOVAL (CONT)



WIRE COLOR	INDEX NO.
WHT/YEL/GRN	39
WHT/YEL/VIO	40
WHT/RED	41

WIRE COLOR	INDEX NO.
WHT/BLK	42
WHT/YEL	43

WIRE COLOR	INDEX NO.
WHT/RED/GRY	44
WHT/BRN/GRY	45
WHT/RED/VIO	46

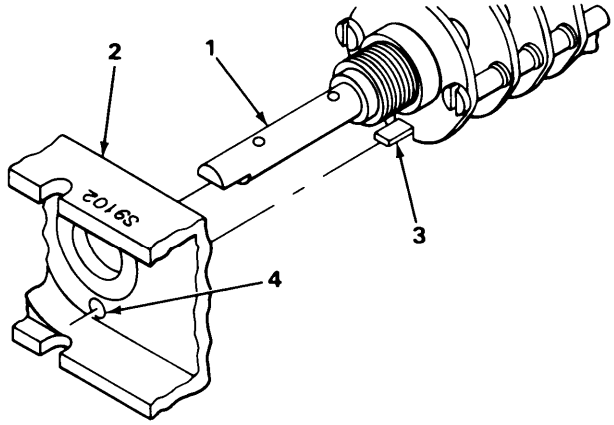
E L1AT087

View from rear of switch. Position switch locating tab as shown in illustrations. Tag all wires with index numbers for location and description.

5. Starting with wafer C, unsolder wires as shown in illustrations through wafer A.
6. Remove switch.

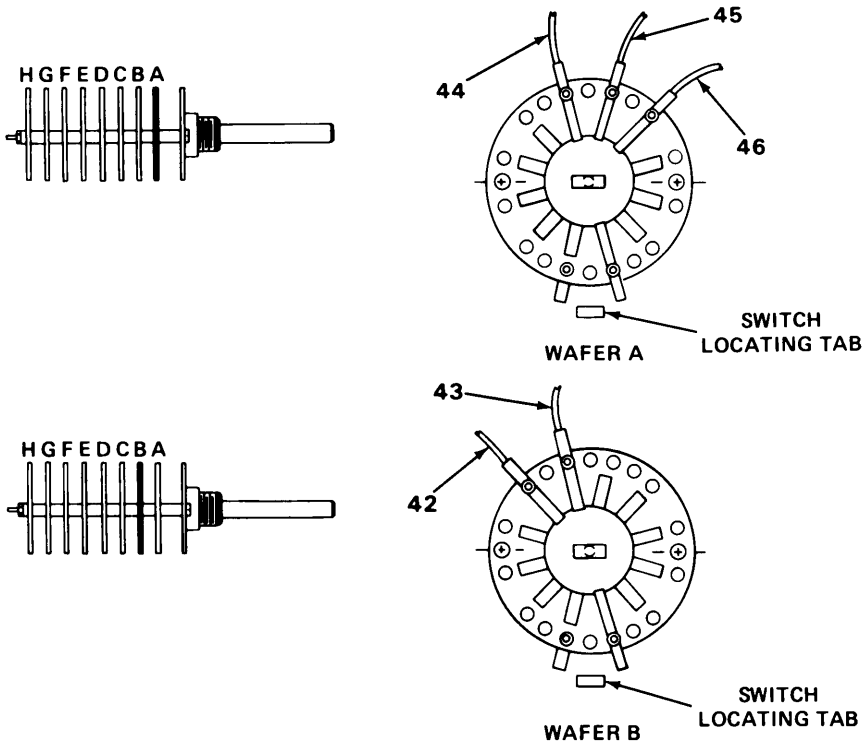
2-84. UNITS SELECTOR SWITCH S9102 REPLACEMENT. (CONT)

INSTALLATION



EL1AT088

1. Position switch stem (1) in hole in panel (2) alining switch locating tab (3) with alinement hole (4).



WIRE COLOR	INDEX NO.
WHT/RED/GRY	44
WHT/BRN/GRY	45
WHT/RED/VIO	46

WIRE COLOR	INDEX NO.
WHT/BLK	42
WHT/YEL	43

EL1AT089

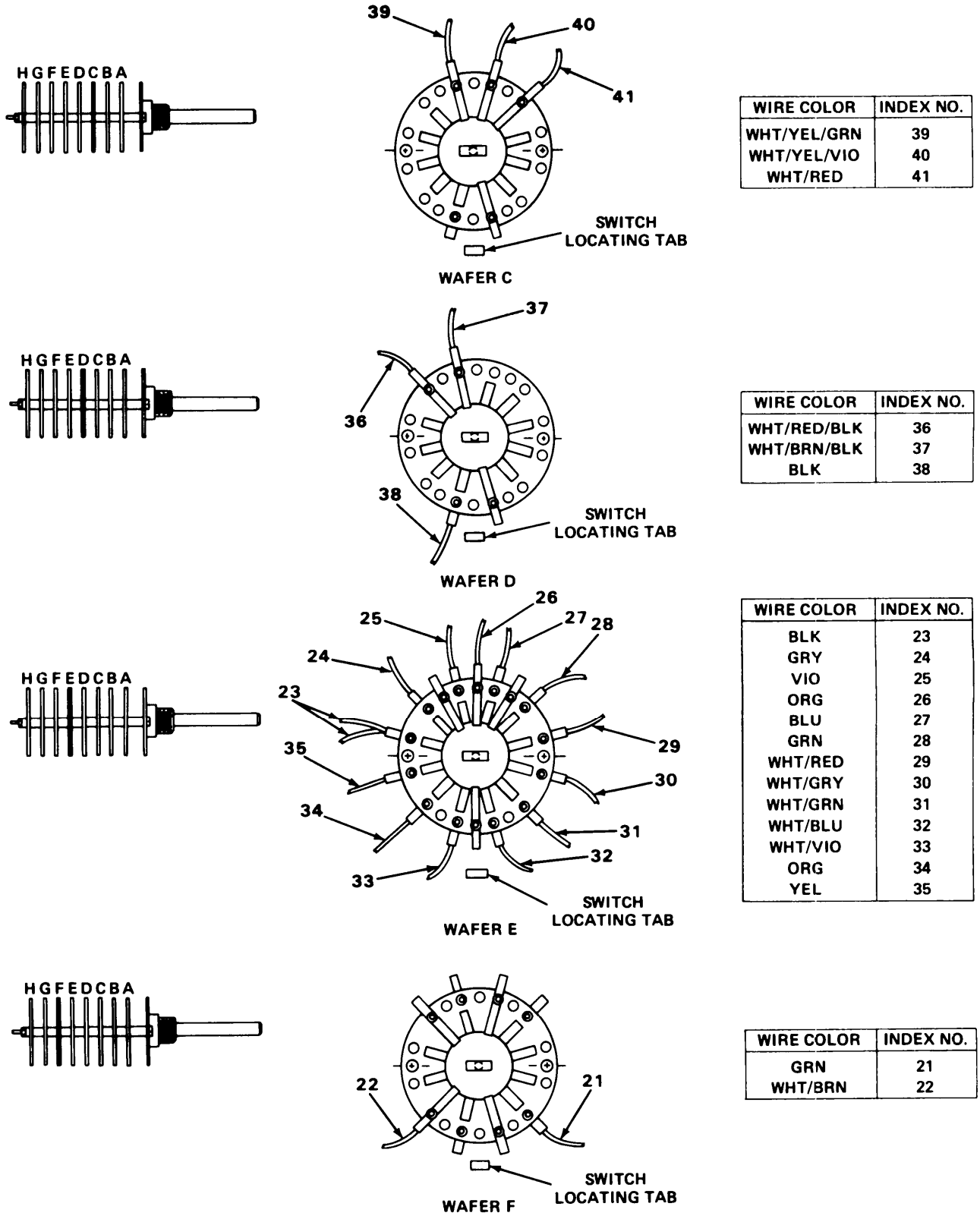
NOTE

View from rear of switch. Position switch locating tab as shown in illustrations. See FO-21 for complete wiring diagram.

2. Starting from wafer A and using tags for reference, solder wires as shown in illustrations through wafer B.

2-84. UNITS FREQUENCY SELECTOR SWITCH S9102 REPLACEMENT. (CONT)

INSTALLATION (CONT)



WIRE COLOR	INDEX NO.
WHT/YEL/GRN	39
WHT/YEL/VIO	40
WHT/RED	41

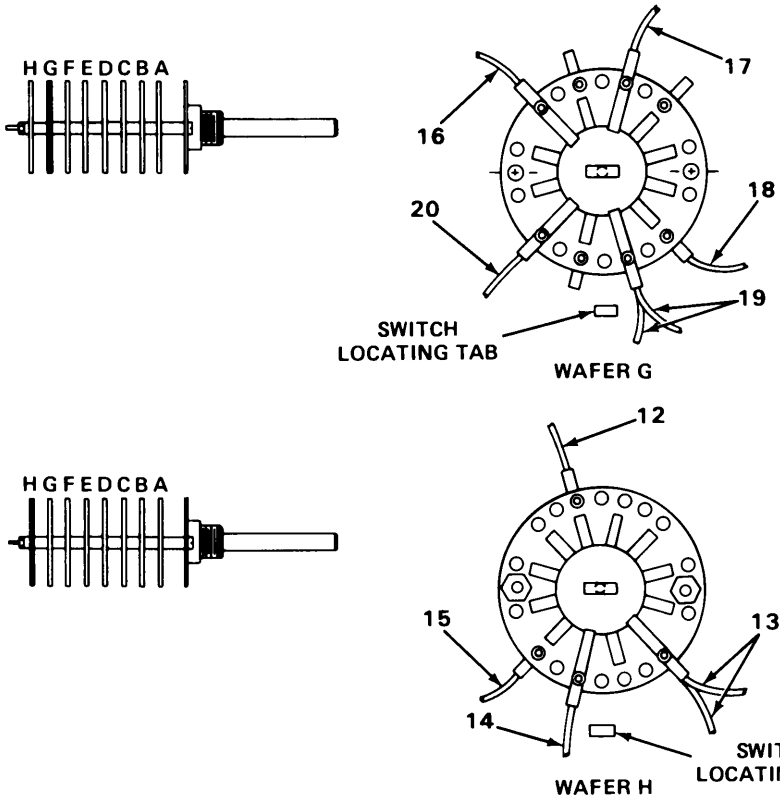
WIRE COLOR	INDEX NO.
WHT/RED/BLK	36
WHT/BRN/BLK	37
BLK	38

WIRE COLOR	INDEX NO.
BLK	23
GRY	24
VIO	25
ORG	26
BLU	27
GRN	28
WHT/RED	29
WHT/GRY	30
WHT/GRN	31
WHT/BLU	32
WHT/VIO	33
ORG	34
YEL	35

WIRE COLOR	INDEX NO.
GRN	21
WHT/BRN	22

EL1AT137

2-84. UNITS FREQUENCY SELECTOR SWITCH S9102 REPLACEMENT. (CONT)



WIRE COLOR	INDEX NO.
WHT/RED/GRN	16
WHT/RED	17
WHT/RED	18
WHT/ORG/BLK	19
WHT/RED/YEL	20

WIRE COLOR	INDEX NO.
WHT/BLU	12
WHT/RED/BRN	13
WHT	14
WHT/GRN/VIO	15

EL1AT138

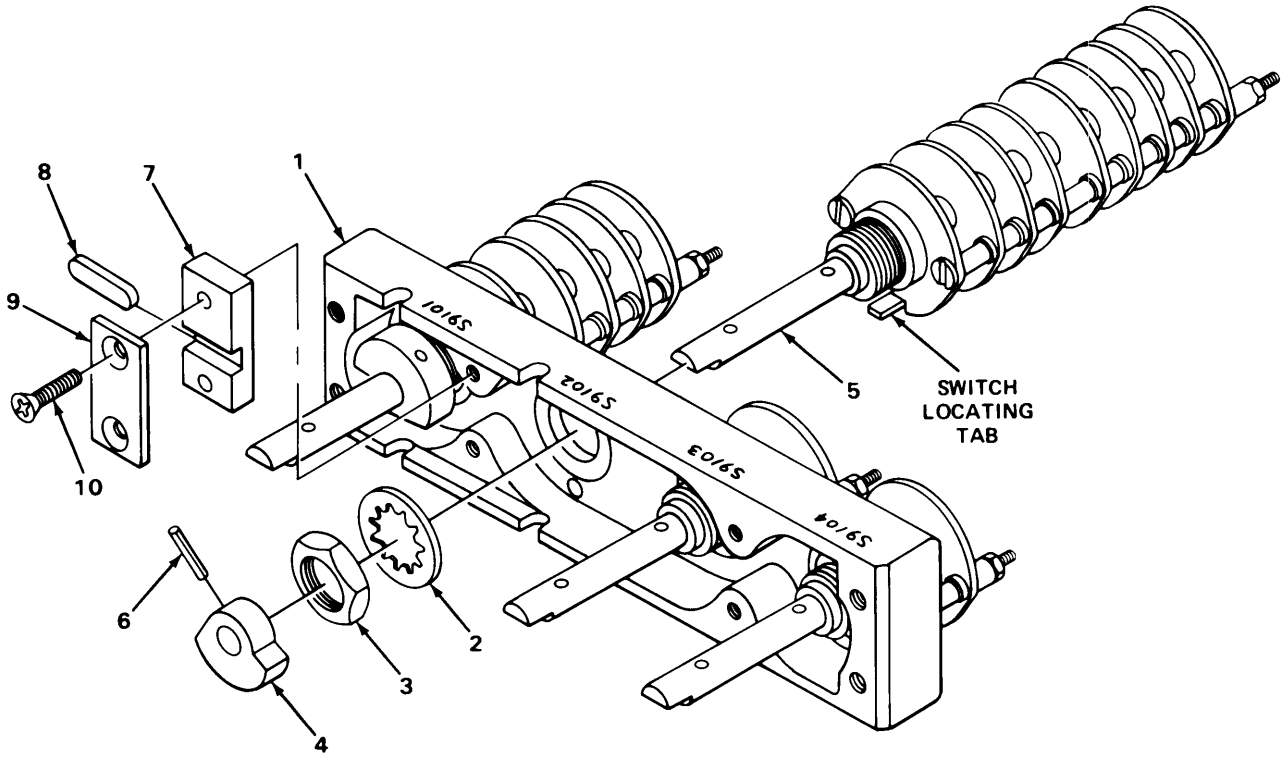
NOTE

View from rear of switch. Position switch locating tab as shown in illustrations. See FO-21 for complete wiring diagram.

3. Starting with wafer C using tags for reference, solder wires as shown in illustrations through wafer H.
4. Remove all tags from wires.

2-84. UNITS FREQUENCY SELECTOR SWITCH S9102 REPLACEMENT. (CONT)

INSTALLATION (CONT)



EL1AT139

5. Position switch locating tab in hole in panel (1) and install IT lockwasher (2) and nut (3) and, using wrench, tighten nut (3).
6. Position cam (4) on switch stem (5) as shown in illustration and install roll pin (6).
7. Position cam stop guide (7) with larger area of guide toward top and install cam stop (8), retaining plate (9), and two screws (10).
8. Using screwdriver, tighten screws (10).

FOLLOW-ON MAINTENANCE: Install switch and wiring assembly (para 2-77).

APPENDIX A

REFERENCES

A-1. SCOPE.

This appendix lists all pamphlets, technical bulletins, technical manuals, and miscellaneous publications referenced in or related to this manual.

A-2. MISCELLANEOUS PUBLICATIONS.

Reporting of Transportation Discrepancies in Shipments	AR 55-38
Reporting of Item and Packaging Discrepancies	AR 735-11-2
Consolidated Index of Army Publications and Blank Forms	DA PAM 310-1
The Army Maintenance Management System (TAMMS)	DA PAM 738-750
First Aid for Soldiers	FM 21-11

A-3. TECHNICAL BULLETINS.

Solder and Soldering	TB SIG 222
Depot Inspection Standard for Repaired Signal Equipment	TB SIG 355-1
Depot Inspection Standard for Refinishing Repaired Signal Equipment	TB SIG 355-2
Depot Inspection Standard for Moisture and Fungus Resistant Treatment	TB SIG 355-3
Field Instructions for Painting and Preserving Electronics Command Equipment Including Camouflage Pattern Painting of Electrical Equipment Shelters	TB 43-0118

A-4. TECHNICAL MANUALS.

Operator's and Organizational Maintenance Manual: Radio Set AN/ARC-131 (NSN 5821-00-937-4686)	TM 11-5820-670-12
Direct Support and General Support (Aviation Intermediate) Maintenance Manual Radio Set AN/ARC-131	FM 11-5820-670-34
Direct Support and General Support Maintenance Repair Parts and Special Tools List (Including Depot Maintenance Repair Parts and Special Tools) for Radio Set AN/ARC-131 (NSN 5821-00-937-4686)	TM 11-5820-670-34P
Operator's Organizational, Direct Support, General Support, and Depot Maintenance Manual: Multimeters ME-26A/U (NSN 6625-00-360-2493), ME-26 B/U and ME-26C/U (NSN 6625-00-646-9409), and ME-26D/U (NSN 6625-00-913-9781)	TM 11-6625-200-15
Organizational, Direct Support, and General Support Maintenance Repair Parts and Special Tools List (Including Depot Maintenance Repair Parts and Special Tools List): Multimeter ME-26A/U (NSN 6625-00-360-2493), ME-26 B/U and ME-26C/U (NSN 6625-00-646-9409), and ME-26D/U (NSN 6625-00-913-9781)	TM 11-6625-200-24P
Operator's, Organizational, Direct Support, and General Support Maintenance Manual: Spectrum Analyzer TS-723A/U, TS-723B/U, TS-723C/U, and TS-723D/U (NSN 6625-00-668-9418)	TM 11-6625-255-14
Operator's and Organizational Maintenance Manual: Voltmeter, Meter ME-30A/U and Voltmeters, Electronic, ME-30B/U, ME-30C/U, and ME-30E/U	TM 11-6625-320-12

A-4. TECHNICAL MANUALS. (CONT)

Organizational, Direct Support and General Support Repair Parts and Special Tools List (Including Depot Maintenance Repair Parts and Special Tools): Voltmeters, Electronic, ME-30A/U, ME-30B/U, and ME-30C/U and ME-30E/U	TM 11-6625-320-24P
Direct Support, General Support, and Depot Maintenance Manual: Voltmeter, Meter ME-30A/U and Voltmeters, Electronic, ME-30B/U and ME-30C/U	TM 11-6625-320-35
Operator's, Organizational, Direct Support, General Support, and Depot Maintenance Manual: Multimeter TS-352B/U (6625-00-553-0172)	TM 11-6625-366-15
Organizational, Direct Support, and General Support Repair Parts and Special Tools Lists (Including Depot Maintenance Repair Parts and Special Tools) for Multimeter TS-352B/U (NSN 6625-00-553-0142)	TM 11-6625-366-24P
Operator's and Organizational Maintenance Manual: Stroboscopes TS-805B/U, TS-805C/U (NSN 6625-00-752-7992) and TS-805D/U (6625-00-196-2858) and TS-805E/U (6625-01-155-4538)	TM 11-6625-396-12
Organizational Maintenance Repair Parts and Special Tools Lists for Stroboscopes TS-805B/U, TS-805C/U (NSN 6625-00-752-7992) and TS-805D/U (6625-00-223-5150)	TM 11-6625-396-20P
Operator and Organizational Maintenance Manual: Meter, Modulation ME-57/U (NSN 6625-00-647-3737)	TM 11-6625-400-12
Organizational Maintenance Repair Parts and Special Tools List: Meter, Modulation ME-57/U (NSN 6625-00-647-3737)	TM 11-6625-400-20P
Direct Support, General Support, and Depot Maintenance Manual: Meter, Modulation ME-57/U (NSN 6625-00-647-3737)	TM 11-6625-400-35
Operator's, Organizational Direct Support, General Support, and Depot Maintenance Manual: Wattmeter AN/URM-120	TM 11-6625-446-15
Organizational, Direct Support and General Support Maintenance Repair Parts and Special Tools Lists (Including Depot Maintenance Repair Parts and Special Tools for Test Set Radio Frequency, Power AN/URM-120 (NSN 6625-00-790-2746)	TM 11-6625-446-24P
Operator's and Organizational Maintenance Manual Including Repair Parts and Special Tools List: Test Sets, Radio AN/VRM-1 and AN/VRM-1A (NSN 6625-00-892-5542)	TM 11-6625-496-12
Operator's Manual: Signal Generators AN/USM-44 (NSN 6625-00-669-4031) and AN/USM-44A (NSN 6625-00-176-5708)	TM 11-6625-508-10
Organizational, Field, and Depot Maintenance Manual: Signal Gene raters AN/USM-44 (NSN 6625-00-669-4031) and AN/USM-44A (NSN 6625-00-176-5708)	TM 11-6625-508-25
Organizational, Direct Support and General Support Maintenance Repair Parts and Special Tools Lists (Including Depot Maintenance Repair Parts and Special Tools List) for Signal Generators AN/USM-44 (NSN 8625-00-669-4031) and AN/USM-44A (6625-00-176-5708)	TM 11-6625-508-24P
Operator, Organizational and Field Maintenance Manual: Voltmeter, Electronic AN/URM-145 (NSN 6625-00-973-3986)	TM 11-6625-524-14
Operator, Organizational, Direct Support, General Support and Depot Maintenance Manual: Electronic Voltmeter AN/URM-145 (NSN 6625-00-973-3986)	TM 11-6625-524-15-1
Organizational, Direct Support, General Support, and Depot Maintenance Repair Parts and Special Tools Lists (Including Depot Maintenance Repair Parts and Special Tools) for Voltmeter, Electronic AN/URM-145 (NSN 6625-00-973-3986)	TM 11-6625-524-24P-1

A-4. TECHNICAL MANUALS. (CONT)

Operator and Organizational Maintenance Manual (Including Repair Parts and Special Tool Lists): Generator, Signal, AN/URM-103	TM 11-6625-586-12
Operator's, Organizational, Direct Support, and General Support Maintenance Repair Parts and Special Tools List (Including Depot Maintenance Repair Parts and Special Tools List) for Multimeter AN/USM-223	TM 11-6625-654-14
Operator's, Organizational, Direct Support and General Support, and Depot Maintenance Manual for Signal Generator AN/URM-127 (NSN 6625-00-783-5965)	TM 11-6625-683-14
Organizational, Direct Support and General Support Maintenance Repair Parts and Special Tools Lists (Including Depot Maintenance Repair Parts and Special Tools for Signal Generator AN/URM-127 (NSN 6625-00-738-5965)	TM 11-6625-683-24P
Operator's Manual: Digital Readout, Electronic Counter AN/USM-207 (NSN 6625-00-911-6368)	TM 11-6625-700-10
Organizational, Direct Support, General Support, and Depot Maintenance Manual: Digital Readout, Electronic Counter AN/USM-207 (NSN 6625-00-911-6368)	TM 11-6625-700-25
Organizational, Direct Support, and General Support Maintenance Repair Parts and Special Tools Lists for Digital Readout Electronic Counter AN/URM-207 (NSN 6625-00-911-6368) and AN/URM-207A (6625-00-044-3228)	TM 11-6625-700-24P
Operator's and Organizational Maintenance Manual: Maintenance Kit MK-1035/ARC-131 (NSN 5821-00-935-0058)	TM 11-6625-1610-12
Direct Support, General Support and Depot Maintenance Manual: Maintenance Kit MK-1035/ARC-131 (NSN 5821-00-935-0058)	TM 11-6624-1610-35
Operator's, Organizational, Direct Support, General Support and Depot Maintenance Manual: Oscilloscope AN/USM-281A (NSN 6625-00-228-2201)	TM 11-6625-1703-15
Administrative Storage of Equipment	TM 740-90-1
Procedures for Destruction of Electronics Materiel to Prevent Enemy Use (Electronics Command)	TM 750-244-2

APPENDIX B

EXPENDABLESUPPLIES AND MATERIALS LIST

B-1. SCOPE.

This appendix lists expendable supplies and materials you will need to maintain the AN/ARC-131.

B-2. EXPLANATION OF COLUMNS.

a. Column 1, Item Number. This number is assigned to the entry in the listing and is referenced in the narrative instructions to identify the material.

b. Column 2, Level. This column identifies the lowest level of maintenance that requires the listed item.

F – Direct Support Maintenance
H – General Support Maintenance

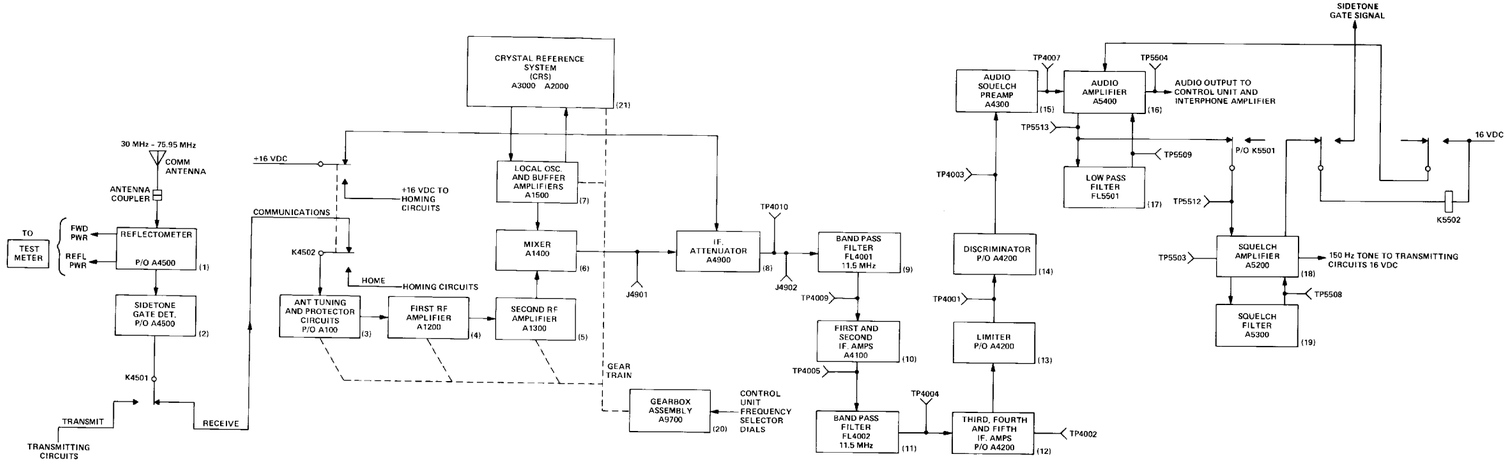
c. Column 3, National Stock Number. This is the National stock number assigned to the item; use it to request or requisition the item.

d. Column 4, Description. Indicates the Federal item name and, if required, a description to identify the item. The last line for each item indicates the Federal Supply Code for Manufacturer (FSCM) in parentheses followed by the part number.

e. Column 5, Unit of Measure (U/M). Indicates the measure used in performing the actual maintenance function. This measure is expressed by a two-character alphabetical abbreviation (eg, ea, in., pr). If the unit of measure differs from the unit of issue, requisition the lowest unit of issue that will satisfy your requirements.

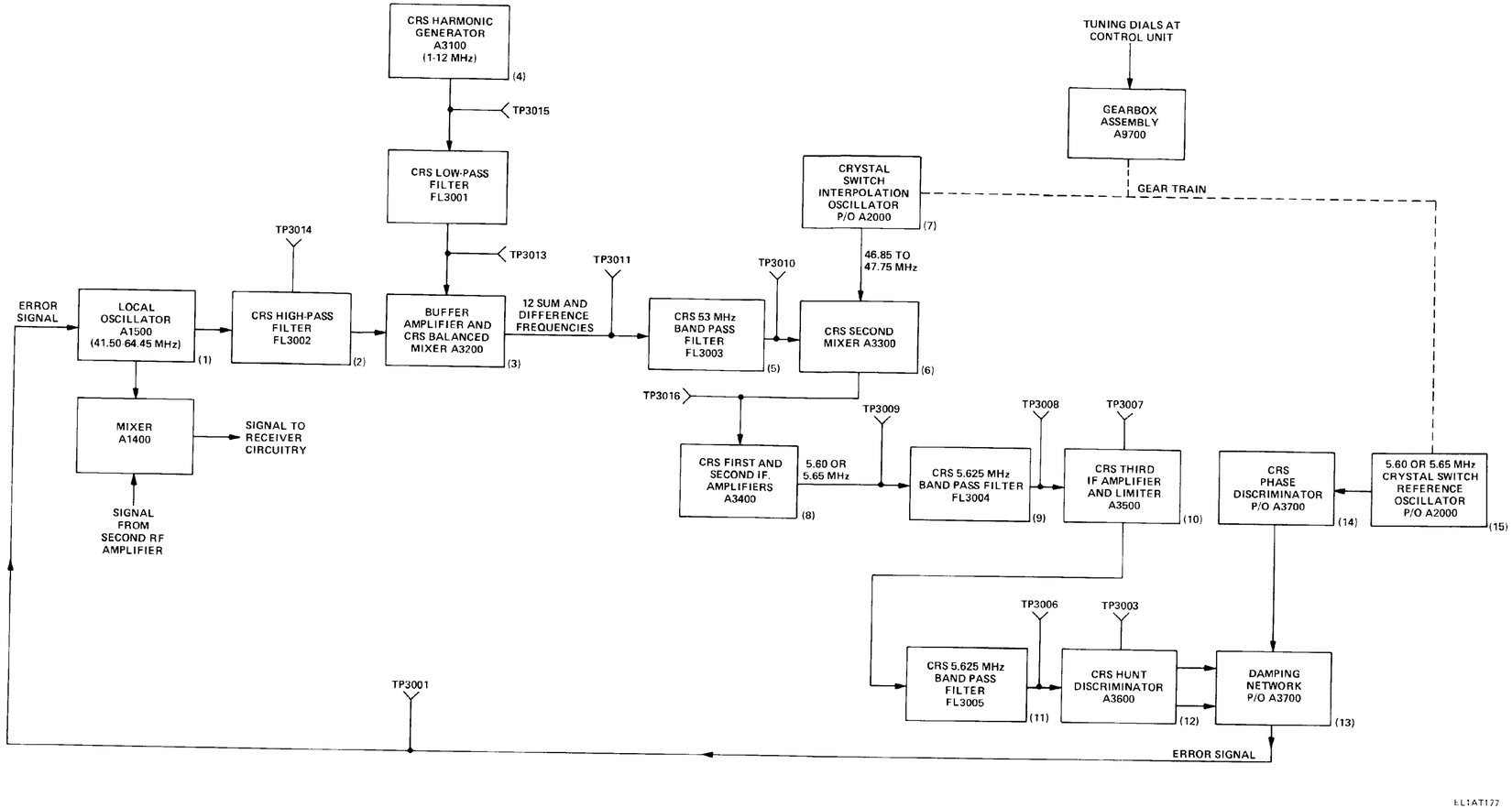
EXPENDABLE SUPPLIES AND MATERIALS LIST

(1) ITEM NUMBER	(2) LEVEL	(3) NATIONAL STOCK NUMBER	(4) DESCRIPTION (FSCM)	(5) U/M
1	F	6850-00-281-4033	Compound, Heat Sink, Dow Corning, DC-340	oz

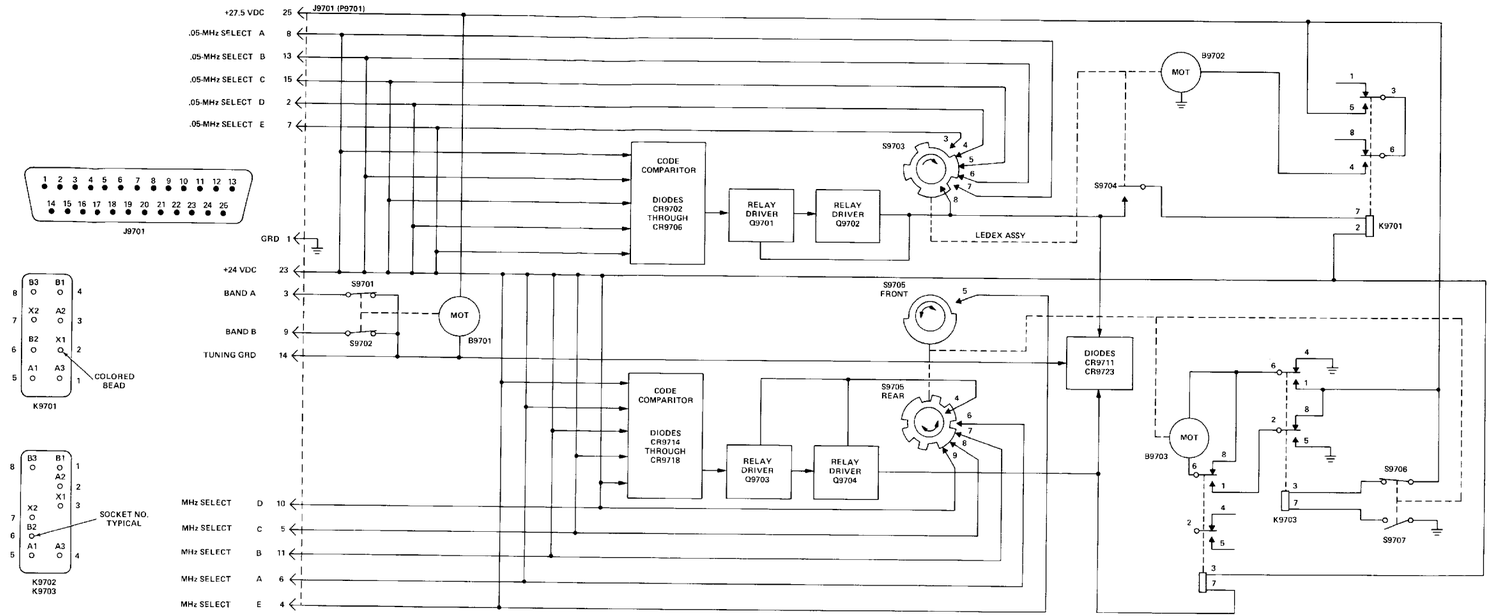


EL1AT176

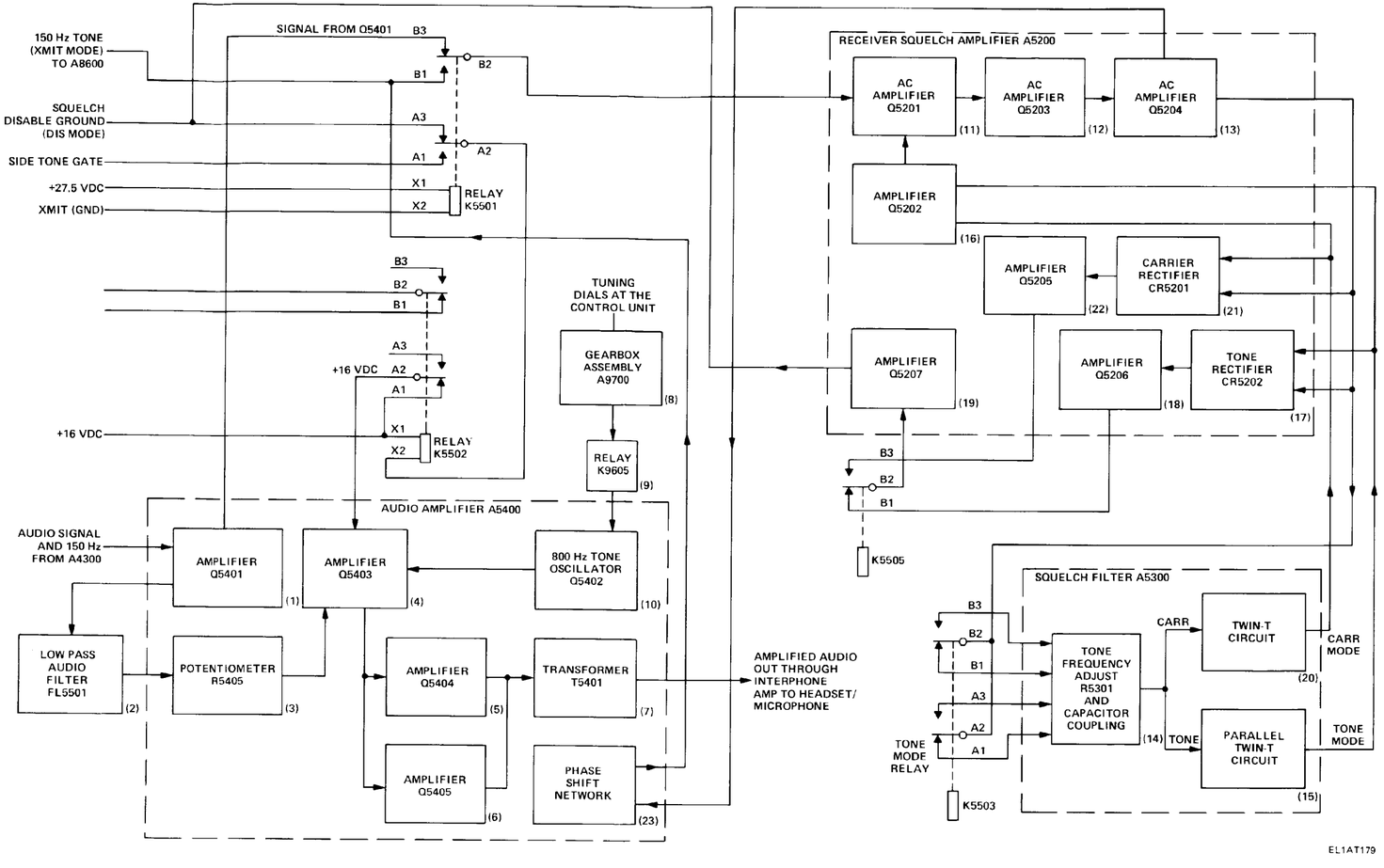
FO-1. Receiver Signal Path.



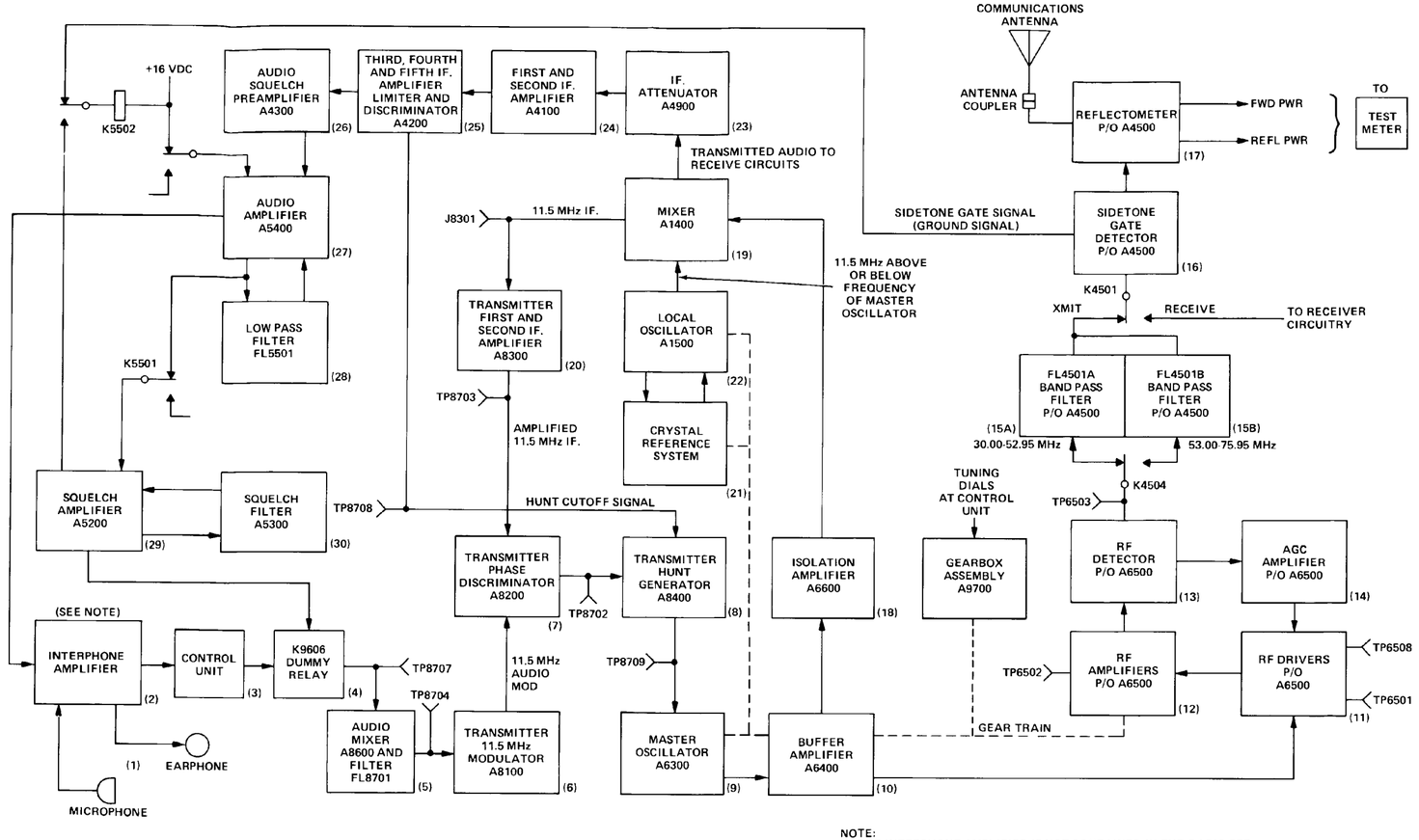
FO-2. Crystal Reference System, Functional Diagram.



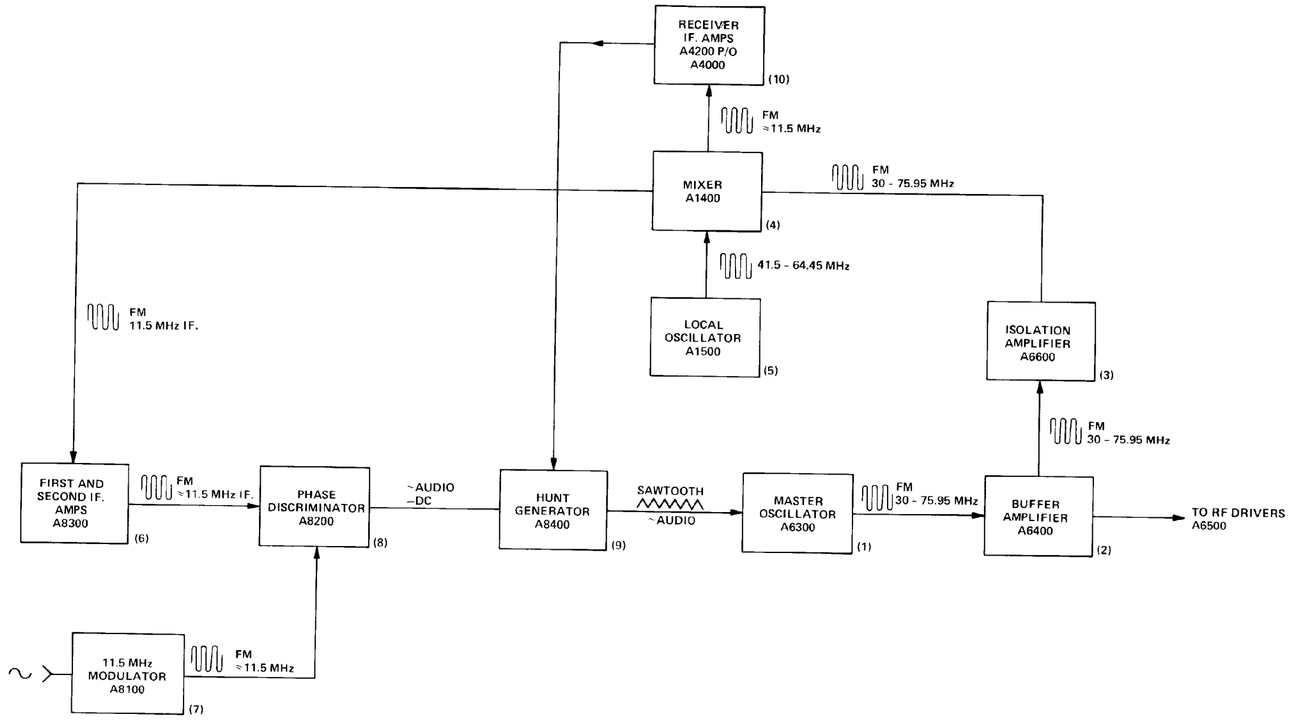
FO-3. Gearbox Assembly, A9700 Simplified.



FO-4. Audio Amplifier A5400, Squelch Amplifier A5200, Squelch Filter A5300.

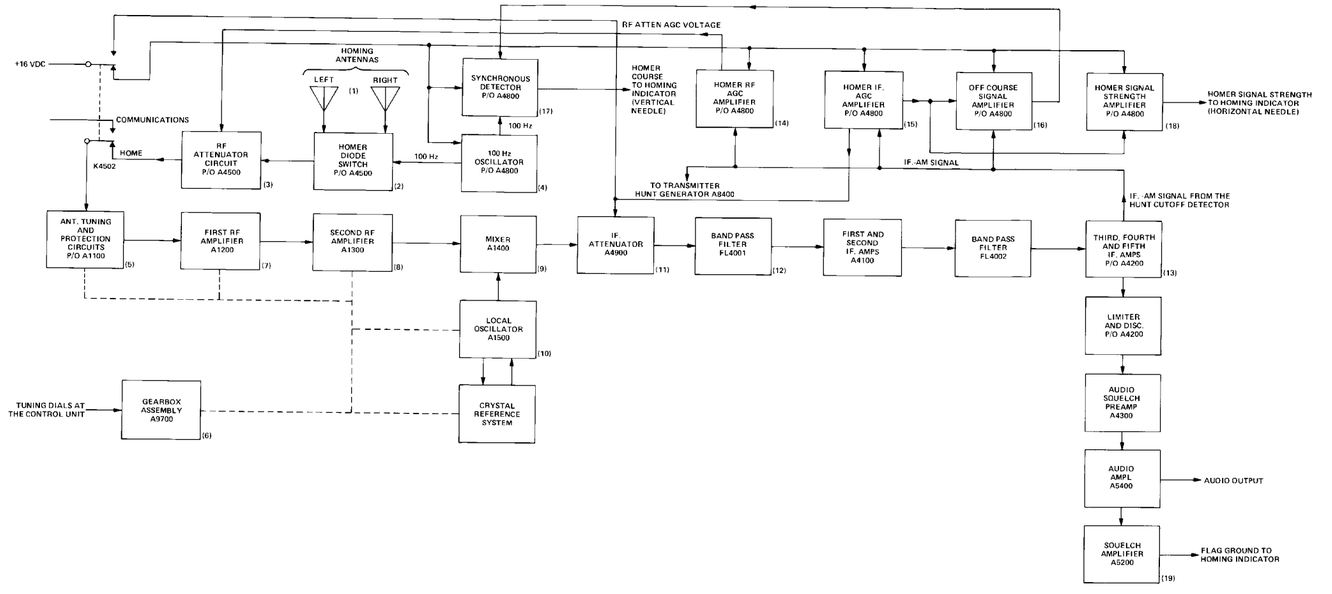


FO-5. Transmitter, Signal Path.



EL1AT181

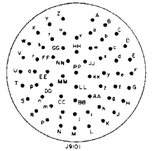
FO-6. Transmitter, Frequency Control Loop.



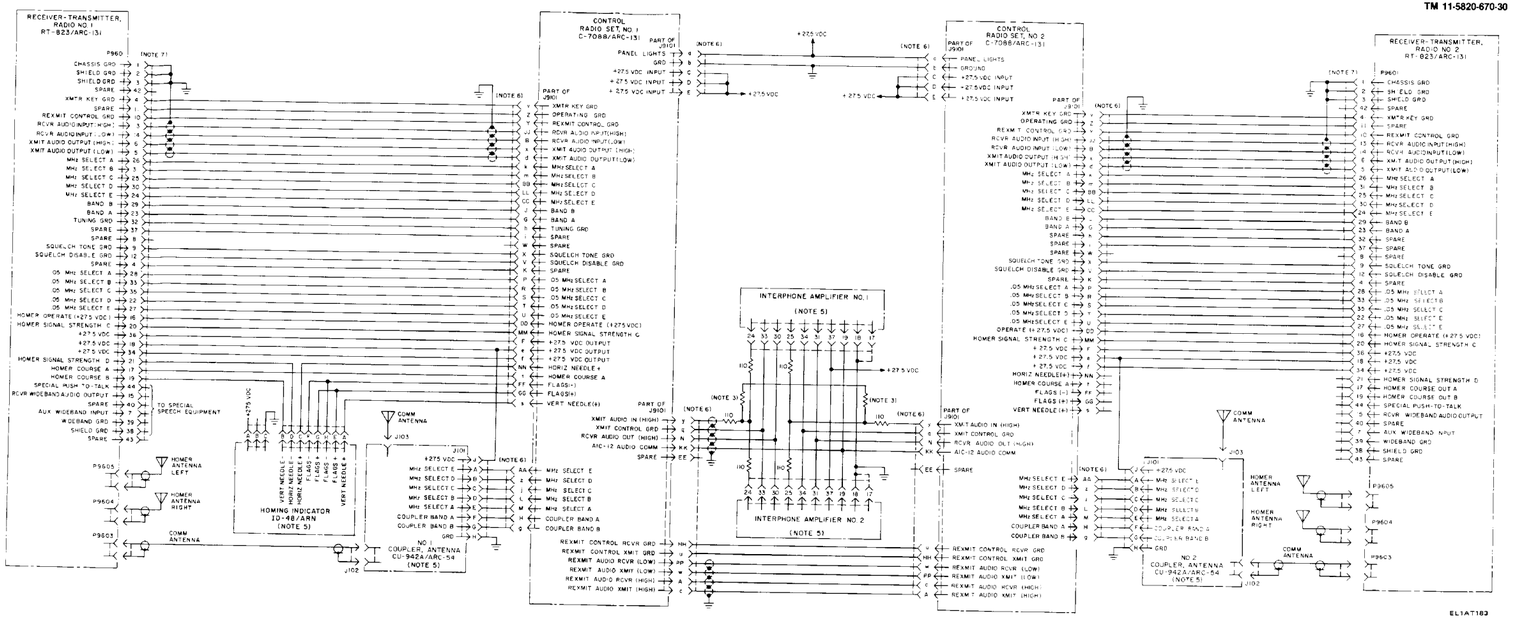
FO-7. Homing Signal Path.

NOTES

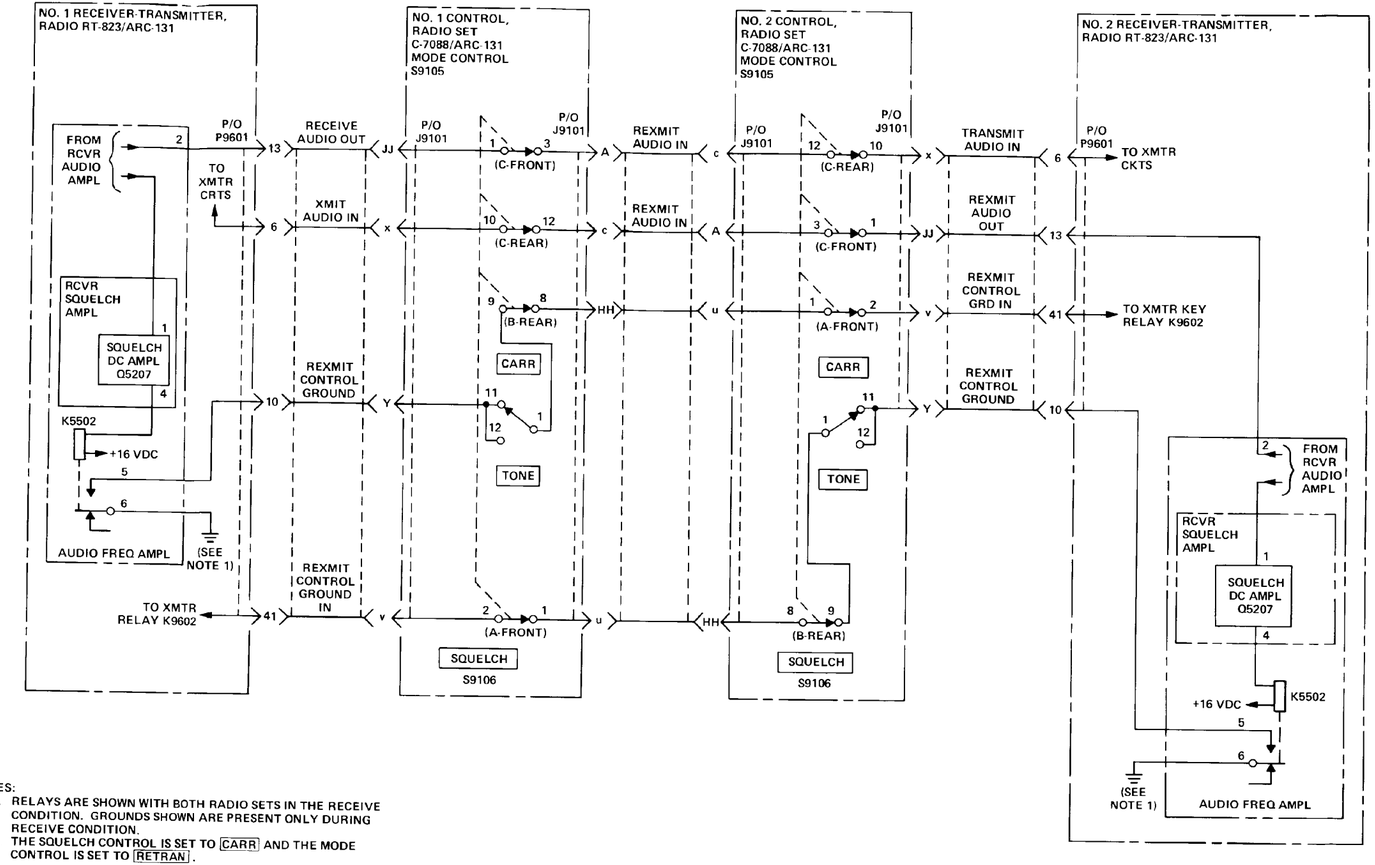
1. UNLESS OTHERWISE INDICATED, RESISTANCES ARE IN OHMS.
2. SYSTEM NO 2 USED FOR REXMIT.
3. VALUE OF RESISTOR DEPENDS ON NUMBER OF INTERPHONE AMPLIFIERS.
4. CONNECTOR VIEWED FROM FRONT SIDE.



5. EQUIPMENT NOT PART OF RADIO SET, AN/ARC-131.
6. UNLABELED CONNECTORS PART OF AIRCRAFT WIRING.
7. CONNECTOR ATTACHED TO MOUNT MT-3564/ARC-131.


RECEIVER-TRANSMITTER, RADIO NO 1 RT-823/ARC-131
CONTROL RADIO SET, NO 1 C-7088/ARC-131
CONTROL RADIO SET, NO 2 C-7088/ARC-131
RECEIVER-TRANSMITTER, RADIO NO 2 RT-823/ARC-131
INTERPHONE AMPLIFIER NO.1 (NOTE 5)
INTERPHONE AMPLIFIER NO.2 (NOTE 5)
HOMING INDICATOR ID-48/ARN (NOTE 5)
NO.1 COUPLER, ANTENNA CU-942A/ARC-54 (NOTE 5)
NO.2 COUPLER, ANTENNA CU-942A/ARC-54 (NOTE 5)
HOMER ANTENNA LEFT
HOMER ANTENNA RIGHT
COMM ANTENNA
TO SPECIAL SPEECH EQUIPMENT
+27.5 VDC
ELIAT183

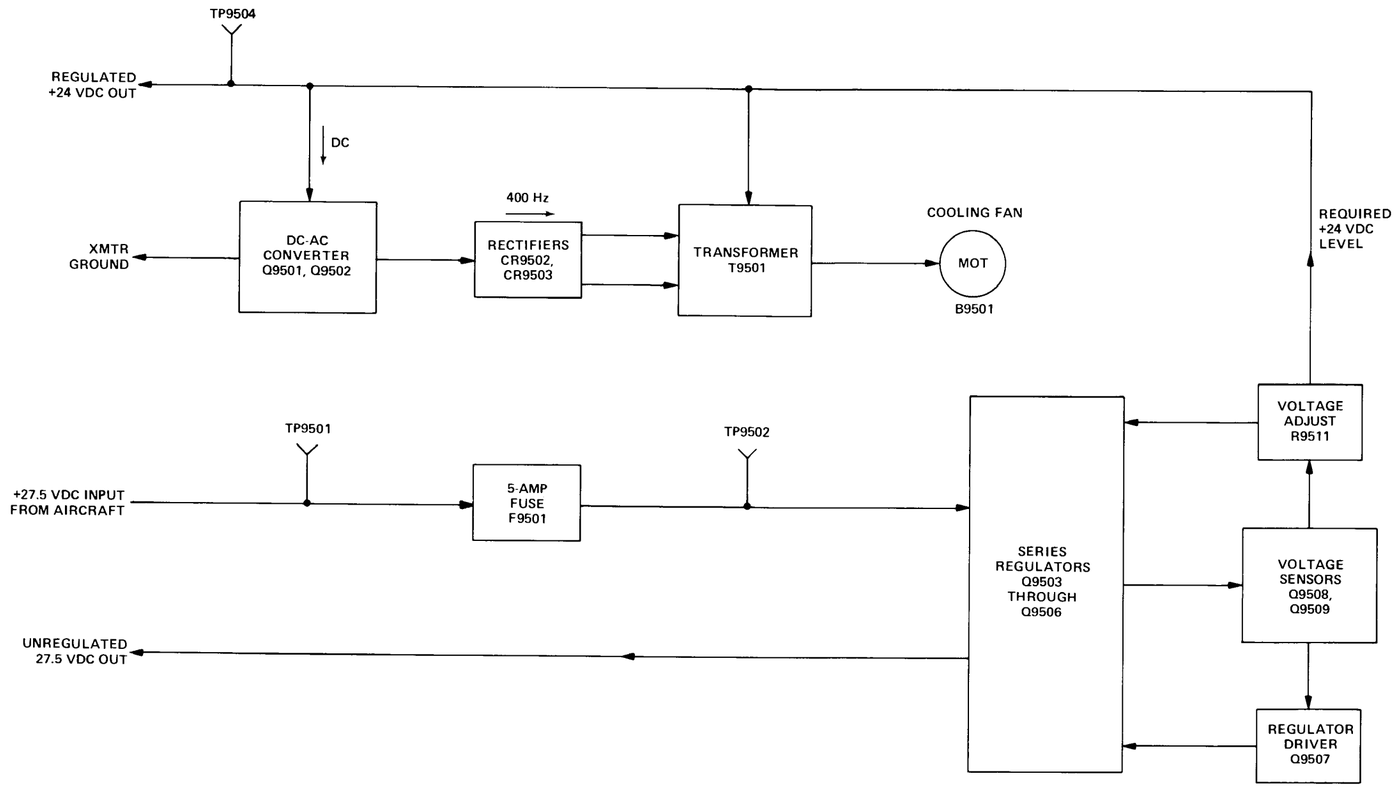
FO-8. Detailed Interconnection Diagram (Retransmit Operation).



NOTES:
1. RELAYS ARE SHOWN WITH BOTH RADIO SETS IN THE RECEIVE CONDITION. GROUNDS SHOWN ARE PRESENT ONLY DURING RECEIVE CONDITION.
2. THE SQUELCH CONTROL IS SET TO CARR AND THE MODE CONTROL IS SET TO RETRAN.

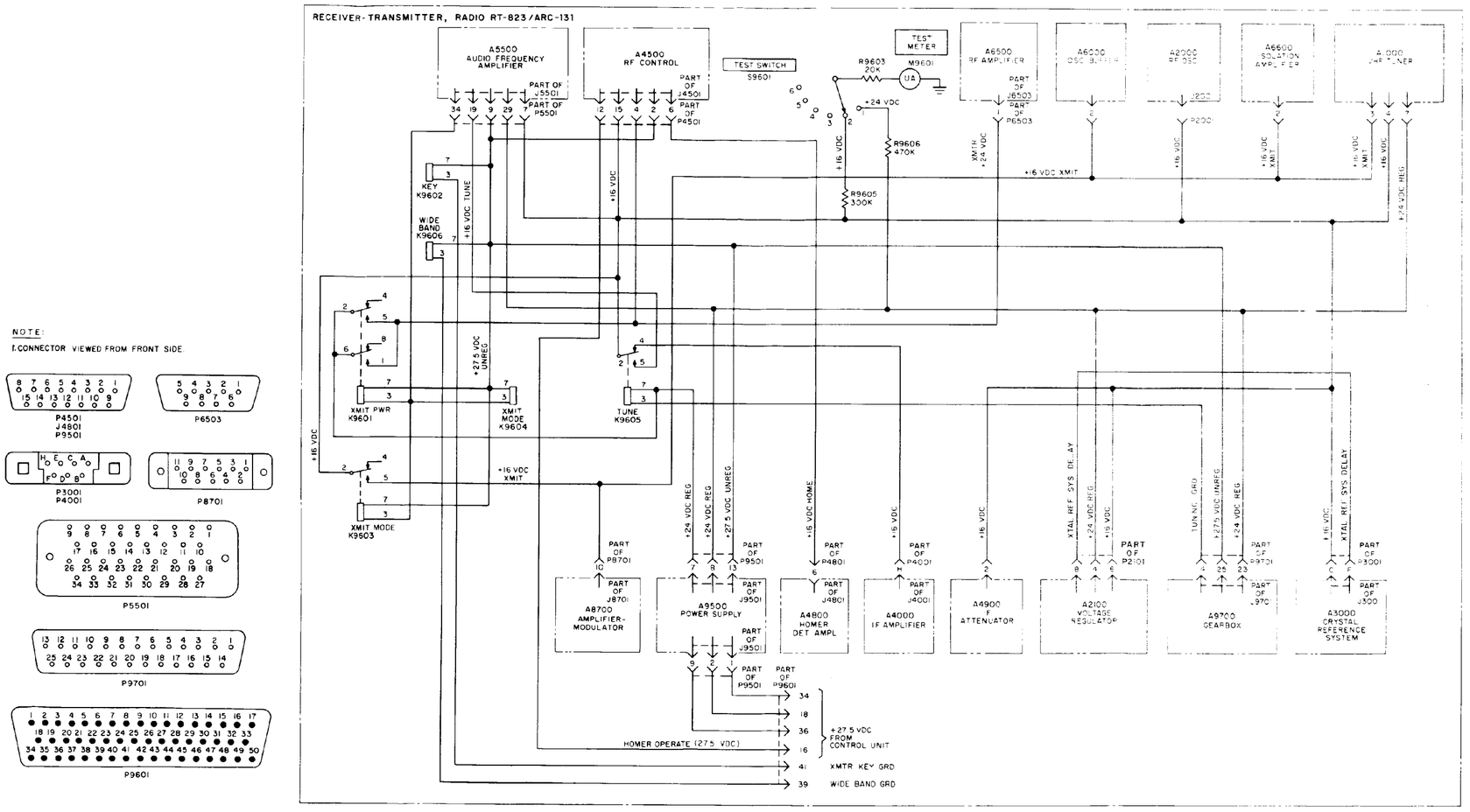
EL1AT184

FO-9. Simplified Interconnection Diagram (Retransmit Operation).



EL1AT185

FO-10. Power Supply Assembly A9500, Simplified.

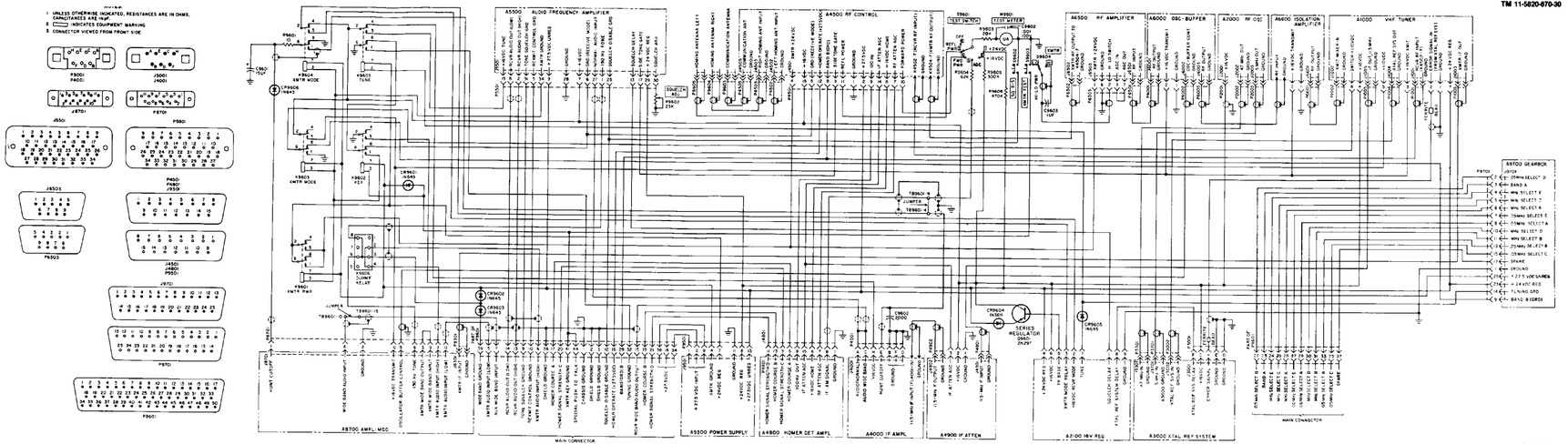


NOTE:

1. CONNECTOR VIEWED FROM FRONT SIDE.

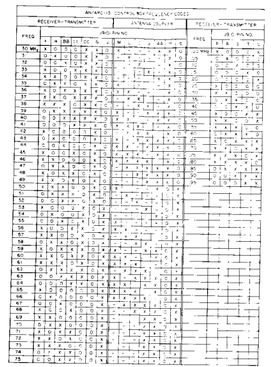
EL1AT186

FO-11. Intraunit Power Distribution.



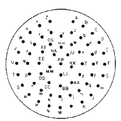
ELTA1187

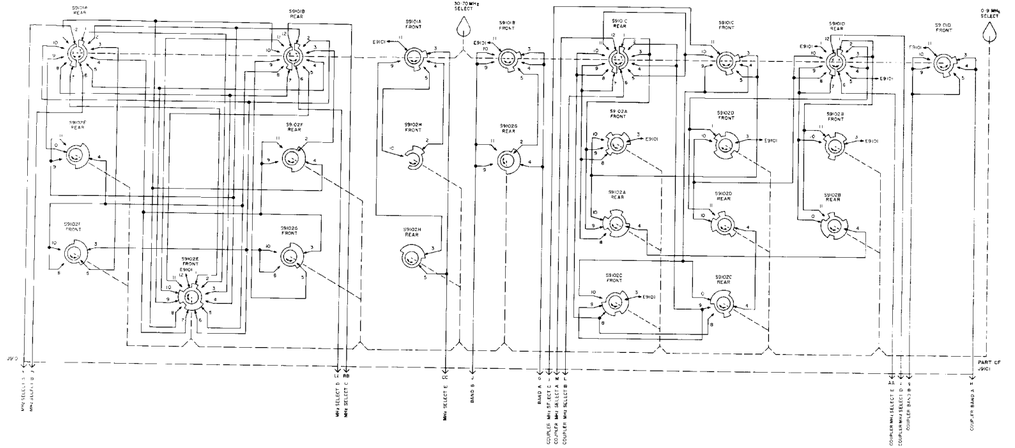
FO-12. Receiver-Transmitter, Radio RT-623/ARC-131, Schematic Diagram.



NOTES:

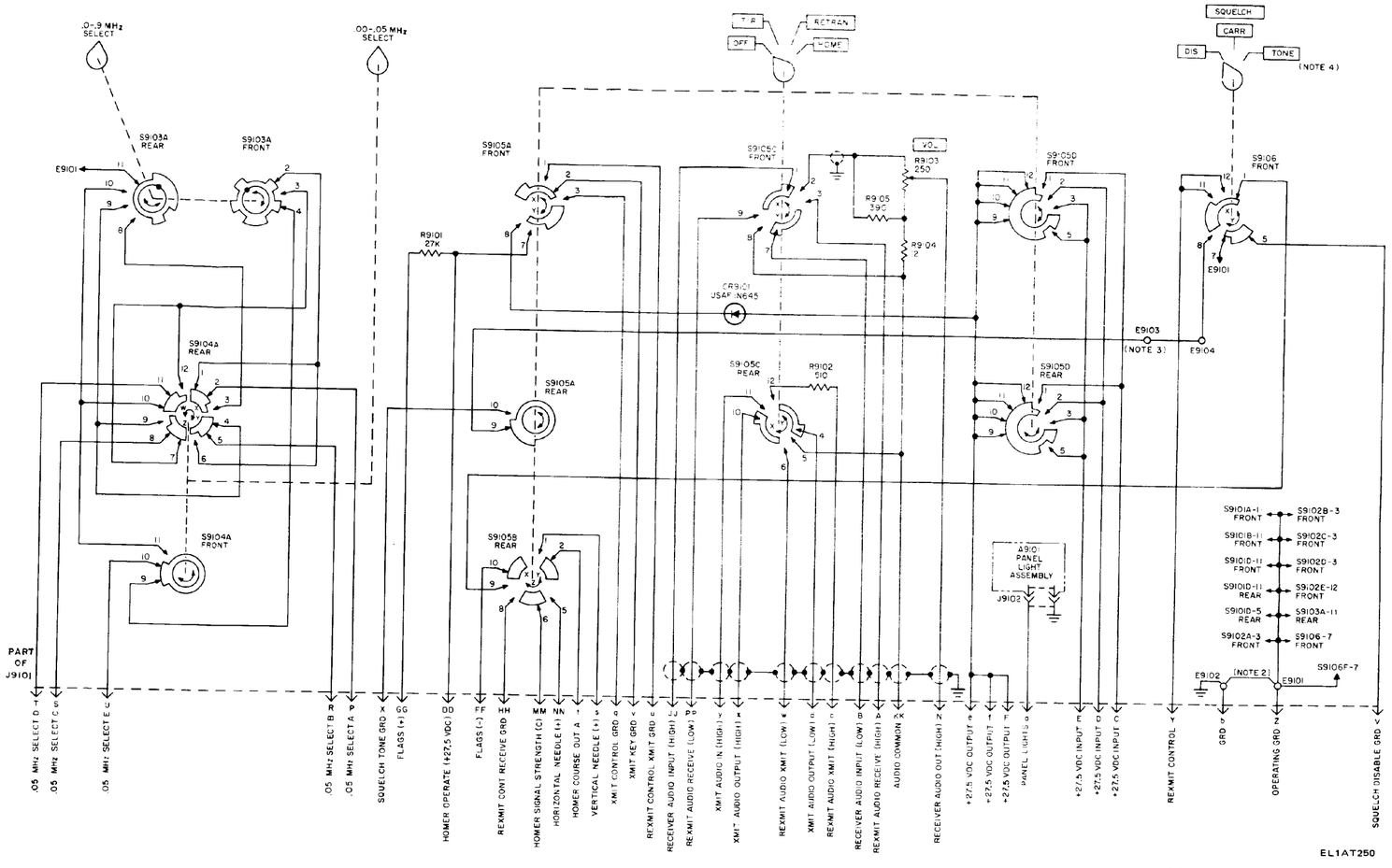
1. UNLESS OTHERWISE INDICATED, RESISTANCES ARE IN OHMS. CAPACITANCES ARE IN μF.
2. REMOVE JUMPER TO DISABLE "ONE SIDE" CONTROL OPERATION.
3. REMOVE JUMPER TO DISABLE "ONE SIDE" CONTROL.
4. "ONE" MAY BE MASKED WHEN "ONE SIDE" CONTROL IS ENABLED.
5. WAFER NUMBERS IN EXTREME COUNTERCLOCKWISE POSITION AND ARE VIEWED FROM FRONT, UNLESS OTHERWISE INDICATED. FRONT OF WAFER IS TO REAR OF CONTROL KNOB. WHEN REQUESTED CONTROL KNOB IS SECTIONAL, SEGMENTS OF WAFERS ARE IDENTIFIED BY A, B, C, ETC.
6. ( ) AS INDICATED EQUIPMENT MARKING
7. CONNECTOR J VIEWED FROM FRONT SIDE.





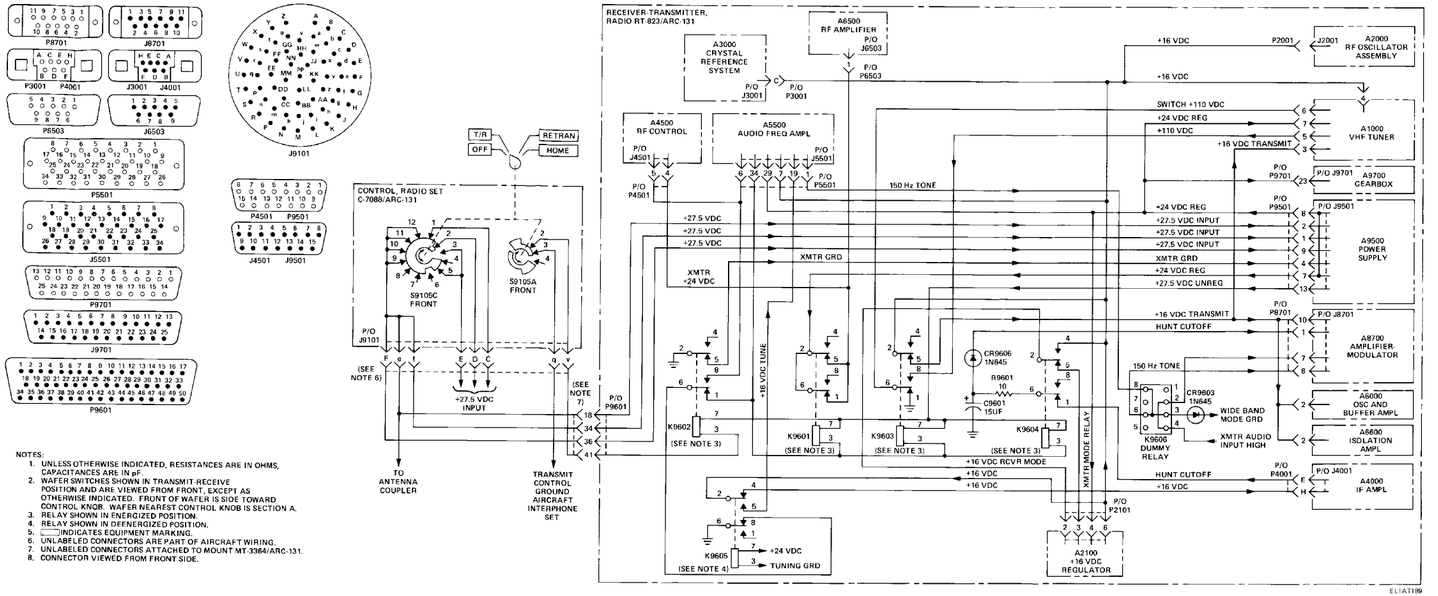
ELTA1198

FO-13. Control Radio Set C-7088/ARC-131, Schematic Diagram (Sheet 1).

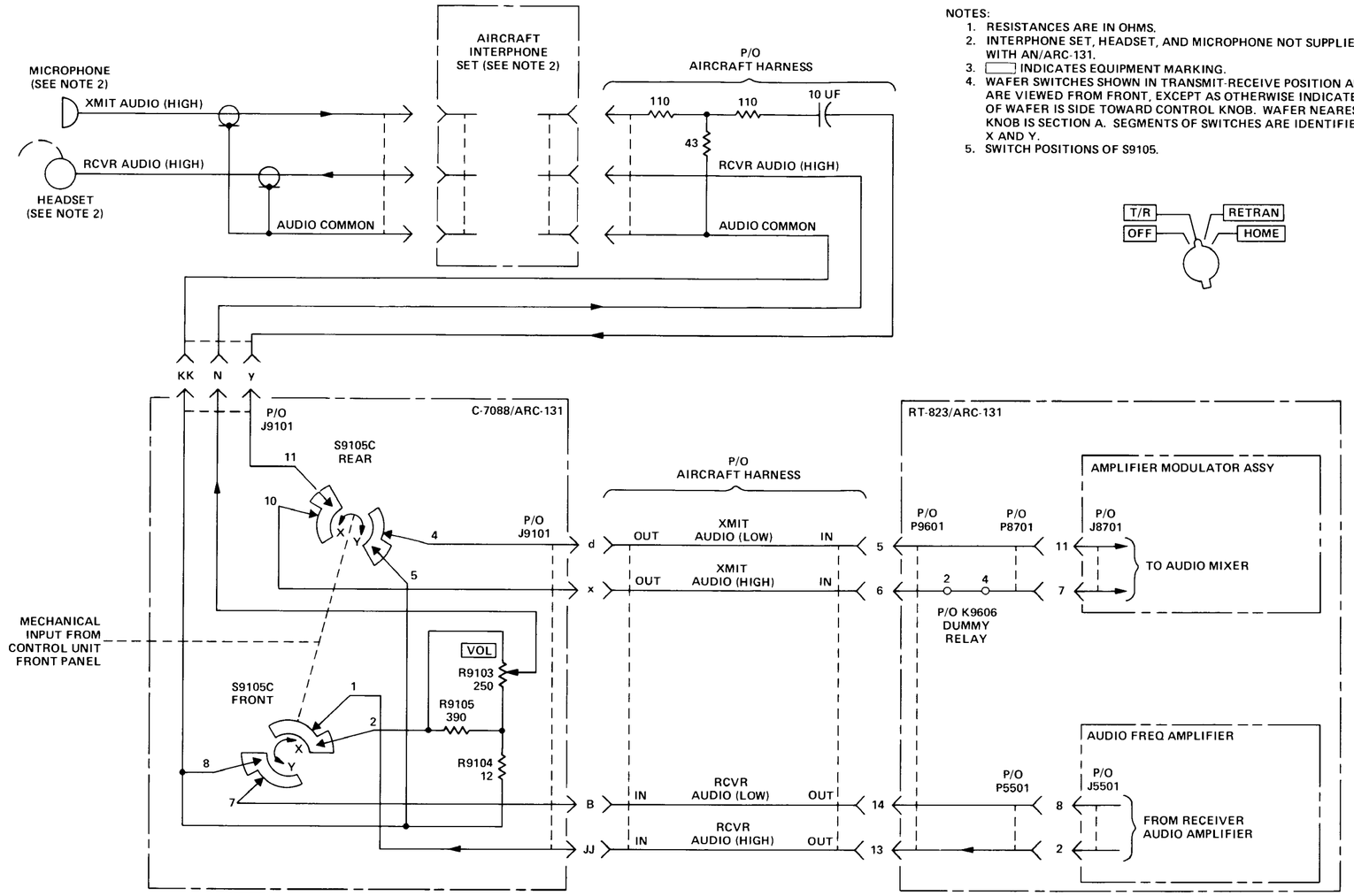


EL1AT250

FO-13. Control Radio Set C-7088/ARC-131, Schematic Diagram (Sheet 2).



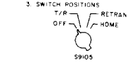
FO-14. Transmitter Keying Circuits Functional Diagram.



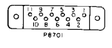
FO-15. Audio Circuits, Radio Set AN/ARC-131.

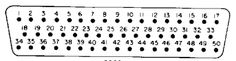
NOTES:

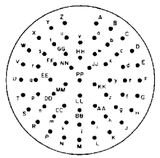
1. UNLESS OTHERWISE INDICATED, RESISTANCES ARE IN OHMS
2. WAFER SWITCHES SHOWN IN EXTREME COUNTERCLOCKWISE POSITION AND ARE VIEWED FROM FRONT, EXCEPT AS OTHERWISE SPECIFIED. FRONT OF WAFER IS SIDE TOWARD CONTROL KNOB. WAFER NEAREST CONTROL KNOB IS SECTION A. SEGMENTS OF WAFERS ARE IDENTIFIED BY X,Y,Z
3. SWITCH POSITIONS

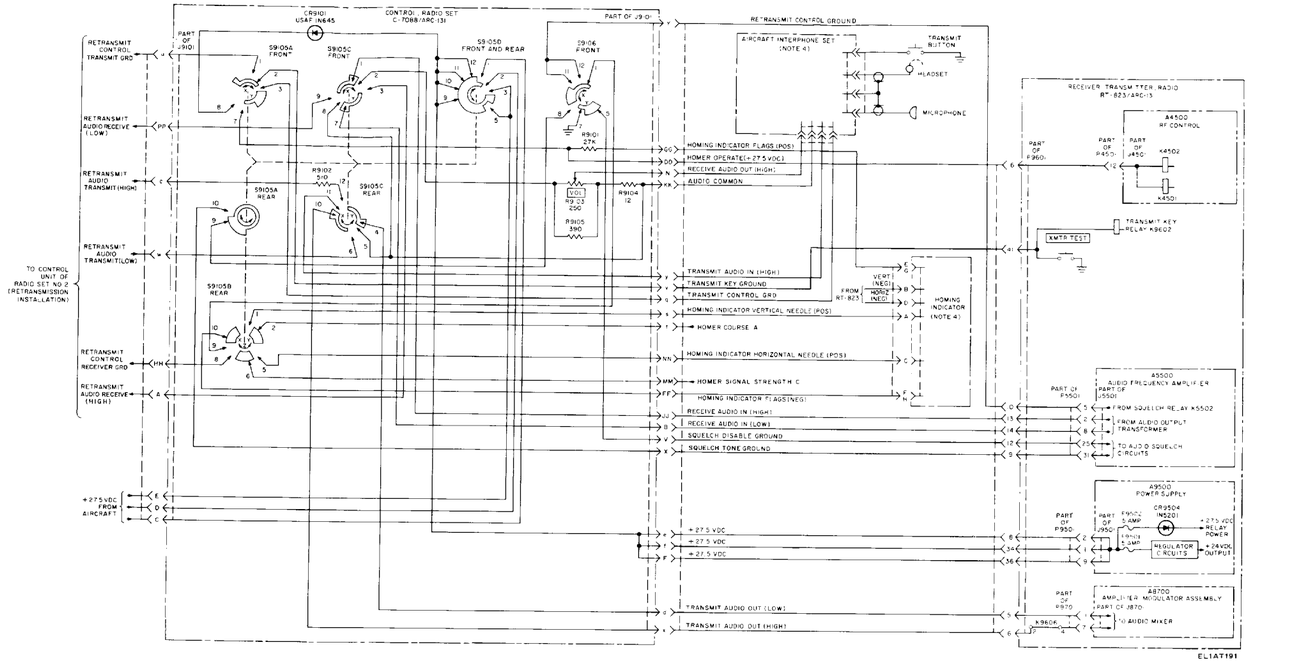


4. HOMING INDICATOR, INTERPHONE SET, HEADSET AND MICROPHONE NOT SUPPLIED WITH AN/ARC-131.
5. REMOVE JUMPER TO DISABLE TONE SQUELCH.
6. ⟨⟩ INDICATES EQUIPMENT MARKING.
7. CONNECTORS VIEWED FROM FRONT SIDE

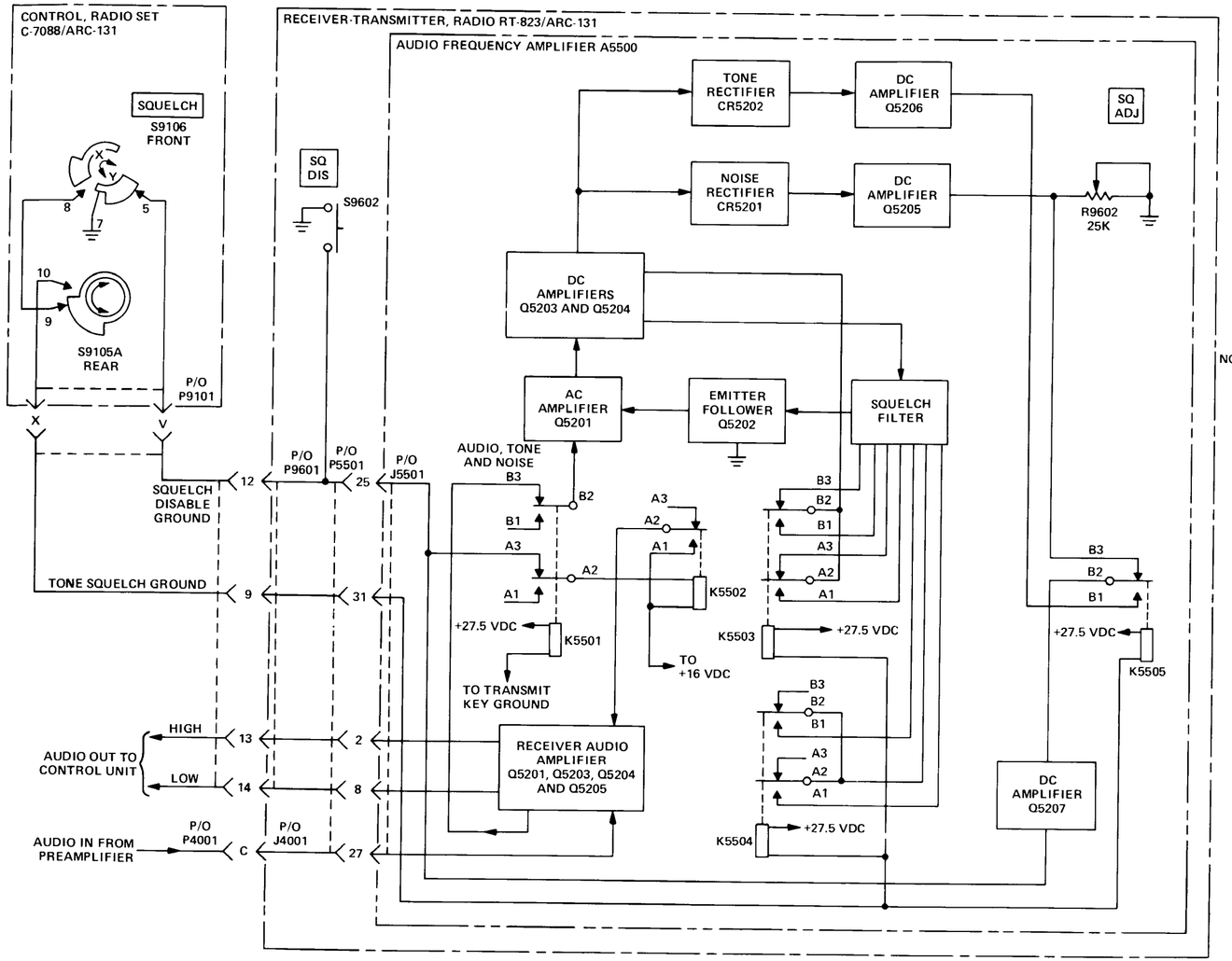








FO-16. Mode Control Circuits, Radio Set AN/ARC-131.



NOTES:
1. RESISTANCES ARE IN OHMS.
2. SWITCH S9105 SHOWN IN OFF POSITION.
3. SWITCH S9106 SHOWN IN DIS POSITION.
4. ▭ INDICATES EQUIPMENT MARKINGS.
5. WAFER SWITCH SECTIONS DESIGNATED A ARE NEAREST THE CONTROL KNOB. FRONT OF SECTION IS SIDE TOWARD CONTROL KNOB. SEGMENTS OF WAFERS ARE IDENTIFIED BY X AND Y.
6. UNLABELED CONNECTORS ARE PART OF AIRCRAFT WIRING.

EL1AT192

FO-17. Squelch Control Circuits, Radio Set AN/ARC-131.

Ⓐ

RECEIVER-TRANSMITTER CODING COMBINATIONS, TENS AND UNITS MHz SELECTORS

	CONNECTOR J9101 PIN NUMBER						
	K	m	BB	LL	CC	G	J
FREQ (MHz)	A	B	CONTROL LINE BAND C	D	E	A	B
30	X	0	0	0	X	X	0
31	0	X	0	0	X	X	0
32	0	0	X	0	X	X	0
33	X	0	0	X	X	X	0
34	X	X	0	0	X	X	0
35	0	X	X	0	X	X	0
36	X	0	X	X	X	X	0
37	X	X	0	X	X	X	0
38	X	X	X	0	X	X	0
39	0	X	X	X	X	X	0
40	0	0	X	X	X	X	0
41	0	0	0	X	X	X	0
42	X	0	0	0	0	X	0
43	0	X	0	0	0	X	0
44	0	0	X	0	0	X	0
45	X	0	0	X	0	X	0
46	X	X	0	0	0	X	0
47	0	X	X	0	0	X	0
48	X	0	X	X	0	X	0
49	X	X	0	X	0	X	0
50	X	X	X	0	0	X	0
51	0	X	X	X	0	X	0
52	0	0	X	X	0	X	0
53	X	0	0	0	X	0	X
54	0	X	0	0	X	0	X
55	0	0	X	0	X	0	X
56	X	0	0	X	X	0	X
57	X	X	0	0	X	0	X
58	0	X	X	0	X	0	X
59	X	0	X	X	X	0	X
60	X	X	0	X	X	0	X
61	X	X	X	0	X	0	X
62	0	X	X	X	X	0	X
63	0	0	X	X	X	0	X
64	0	0	0	X	X	0	X
65	X	0	0	0	0	0	X
66	0	X	0	0	0	0	X
67	0	0	X	0	0	0	X
68	X	0	0	X	0	0	X
69	X	X	0	0	0	0	X
70	0	X	X	0	0	0	X
71	X	0	X	X	0	0	X
72	X	X	0	X	0	0	X
73	X	X	X	0	0	0	X
74	0	X	X	X	0	0	X
75	0	0	X	X	0	0	X

X INDICATES THAT THE LINE IS GROUNDED.
0 INDICATES THAT THE LINE IS OPEN.

Ⓑ

RECEIVER-TRANSMITTER CODING COMBINATIONS, TENTHS AND HUNDREDTHS MHz SELECTORS

	CONNECTOR J9101 PIN NUMBER				
	P	R	S	T	U
FREQ (MHz)	A	CONTROL LINE B	C	D	E
.00	X	0	0	0	X
.05	0	X	0	0	0
.10	0	0	X	0	0
.15	0	0	0	X	0
.20	0	0	0	0	X
.25	X	0	0	0	0
.30	X	X	0	0	0
.35	0	X	X	0	0
.40	0	0	X	X	0
.45	X	0	0	X	X
.50	X	X	0	0	X
.55	X	X	X	0	0
.60	0	X	X	X	0
.65	X	0	X	X	X
.70	X	X	0	X	X
.75	X	X	X	0	X
.80	X	X	X	X	0
.85	0	X	X	X	X
.90	0	0	X	X	X
.95	0	0	0	X	X

X INDICATES THAT THE LINE IS GROUNDED.
0 INDICATES THAT THE LINE IS OPEN.

Ⓒ

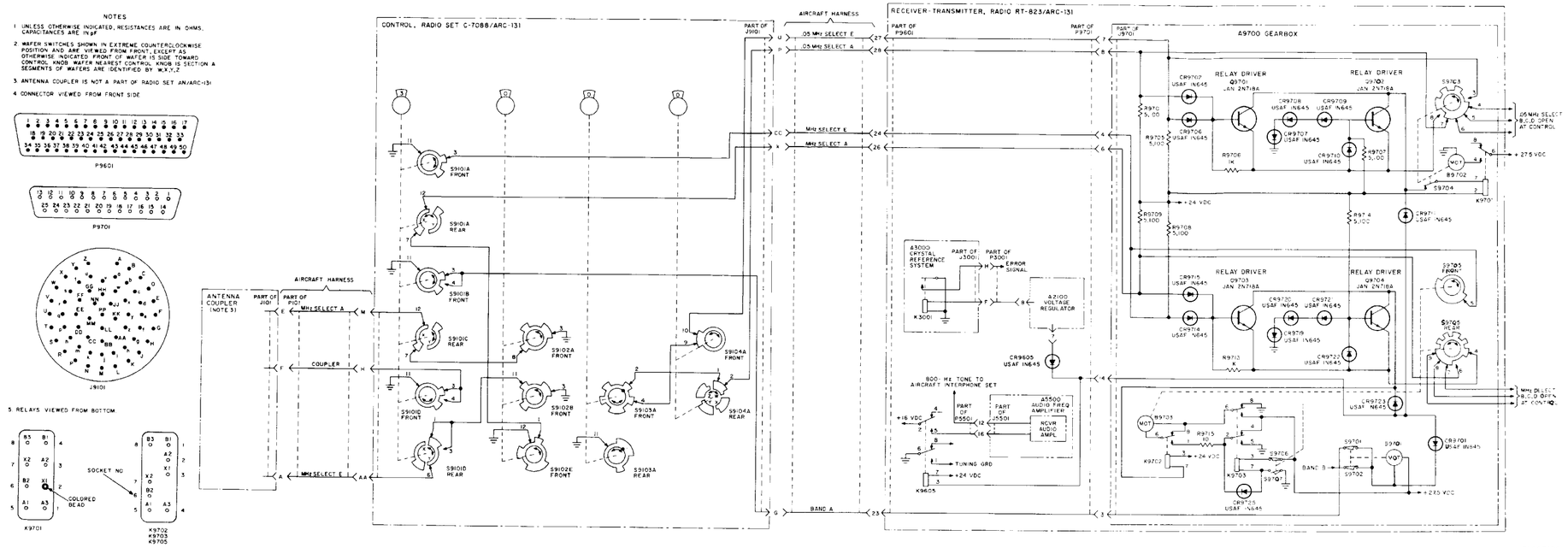
ANTENNA COUPLER CODING COMBINATIONS, TENS AND UNITS MHz SELECTORS

	CONNECTOR J9101 PIN NUMBER						
	M	L	J	Z	AA	H	G
FREQ (MHz)	A	CONTROL LINE BAND B	C	D	E	A	B
30	X	0	0	0	X	X	0
31	0	X	0	0	0	X	0
32	0	0	X	0	0	X	0
33	0	0	0	X	0	X	0
34	0	0	0	0	X	X	0
35	X	0	0	0	0	X	0
36	X	X	0	0	0	X	0
37	0	X	X	0	0	X	0
38	0	0	X	X	0	X	0
39	X	0	0	X	X	X	0
40	X	X	0	0	X	X	0
41	X	X	X	0	0	X	0
42	0	X	X	X	0	X	0
43	X	0	X	X	X	X	0
44	X	X	0	X	X	X	0
45	X	X	X	0	X	X	0
46	X	X	X	X	0	X	0
47	0	X	X	X	X	X	0
48	0	0	X	X	X	X	0
49	0	0	0	X	X	X	0
50	X	0	0	0	X	0	X
51	0	X	0	0	0	0	X
52	0	0	X	0	0	0	X
53	0	0	0	X	0	0	X
54	0	0	0	0	X	0	X
55	X	0	0	0	0	0	X
56	X	X	0	0	0	0	X
57	0	X	X	0	0	0	X
58	0	0	X	X	0	0	X
59	X	0	0	X	X	0	X
60	X	X	0	0	X	0	X
61	X	X	X	0	0	0	X
62	0	X	X	X	0	0	X
63	X	0	X	X	X	0	X
64	X	X	0	X	X	0	X
65	X	X	X	0	X	0	X
66	X	X	X	X	0	0	X
67	0	X	X	X	X	0	X
68	0	0	X	X	X	0	X
69	0	0	0	X	X	0	X
70	0	0	0	X	X	0	X
71	0	0	0	X	X	0	X
72	0	0	0	X	X	0	X
73	0	0	0	X	X	0	X
74	0	0	0	X	X	0	X
75	0	0	0	X	X	0	X

X INDICATES THAT THE LINE IS GROUNDED.
0 INDICATES THAT THE LINES ARE NOT GROUNDED AND ARE CONNECTED TOGETHER.

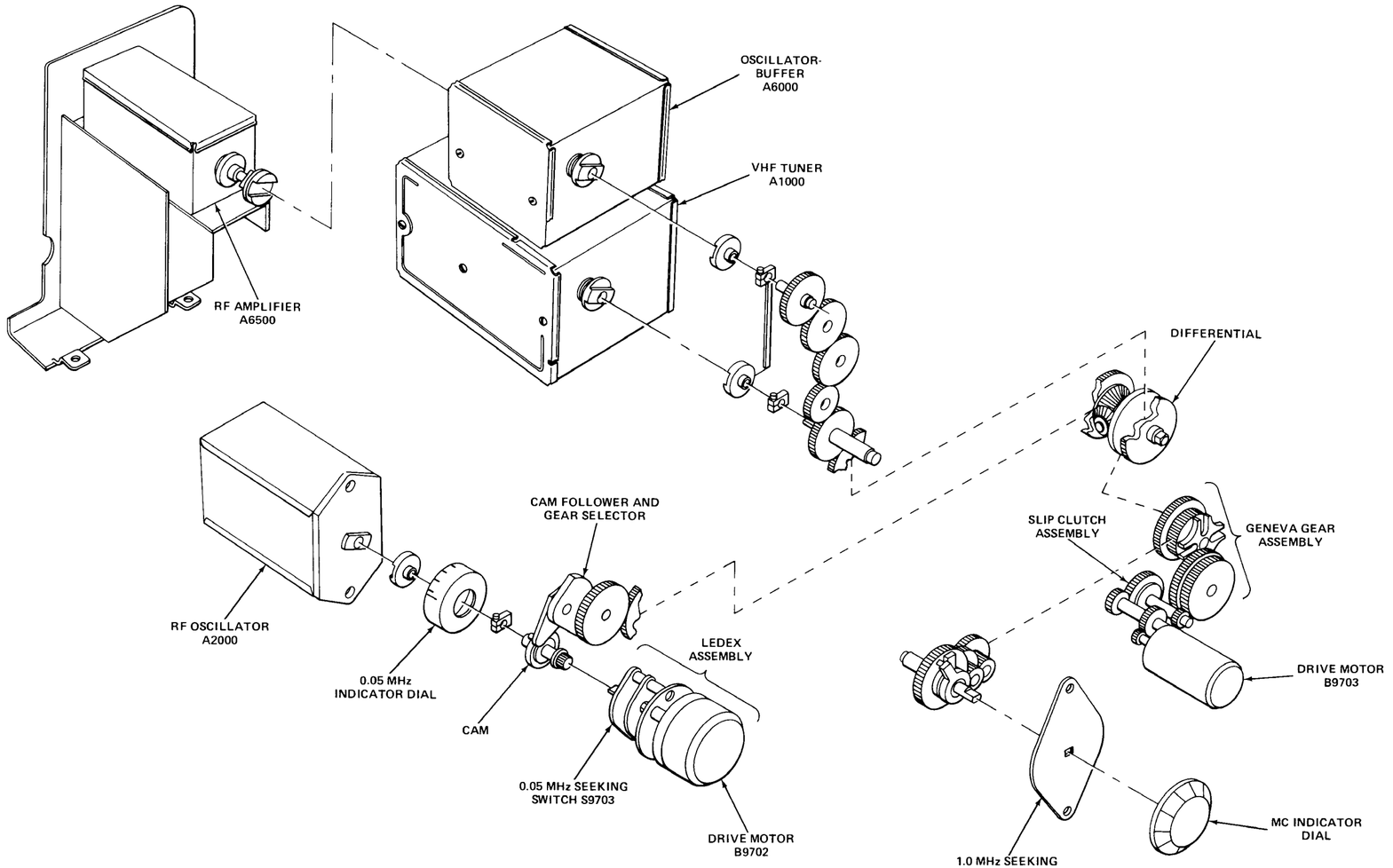
EL1AT193

FO-18. Receiver-Transmitter, Coding Combinations.



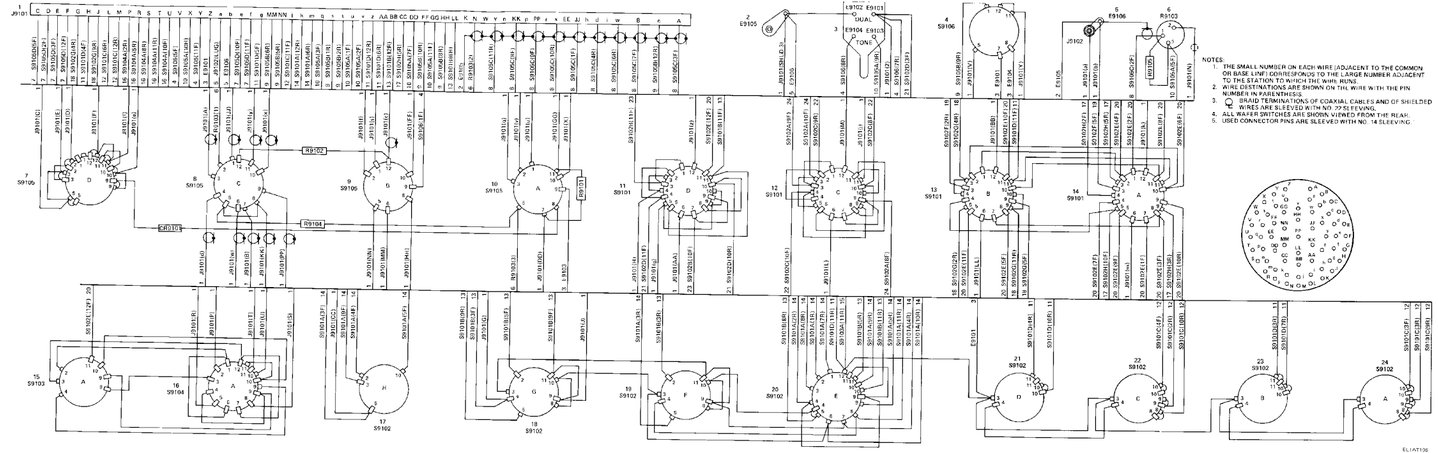
EL1AT194

FO-19. Tuning Control Circuits, Functional Diagram.



EL1AT195

FO-20. Gearbox Mechanical Tuning Assembly, Mechanical Diagram.


NOTES:
1. THE SMALL NUMBER ON EACH WIRE ADJACENT TO THE COMMON OR BASE LINE CORRESPONDS TO THE LARGE NUMBER ADJACENT TO THE STATION TO WHICH THE WIRE RUNS.
2. WIRE DESTINATIONS ARE SHOWN ON THE WIRE WITH THE PIN NUMBER IN PARENTHESIS.
3. BRAID TERMINATIONS OF COAXIAL CABLES AND OF SHIELDED WIRES ARE SLEEVED WITH NO. 22 SLEEVING.
4. ALL WAFER SWITCHES ARE SHOWN VIEWED FROM THE REAR.
5. USED CONNECTOR PINS ARE SLEEVED WITH NO. 14 SLEEVING.
ELIAT106

FO-21. Control, Radio Set C-7098/ARC-131, Wiring Diagram.

INDEX

Subject — Page

A

Administrative storage ... 1-2
Alinement and adjustment procedures
- Audio level adjustment ... 2-132
- Carrier squelch adjustment ... 2-134
- Gearbox assembly A9700 alinement ... 2-130
- General ... 2-126
- Homing adjustment ... 2-148
- Local oscillator alinement ... 2-146
- Narrow band deviation adjustments ... 2-140
- Receiver sensitivity adjustments ... 2-142
- Rf amplifier assembly A6500 alinement ... 2-126
- Tone modulation frequency and deviation adjustment, 150 Hz ... 2-136
- Tone squelch adjustment ... 2-138

Antenna tuning and protection module A1100 ... 1-22
Assembly replacement, A1000 ... 2-214
Assemby replacement, A1000, A2000, A6000, and A9700 ... 2-208
Assembly replacement, A1600 ... 2-221
Assembly replacement, A2000 ... 2-218
Assembly replacement, A2100 ... 2-184
Assembly replacement, A4500 ... 2-182
Assembly replacement, A4900 ... 2-202
Assembly replacement, A6000 ... 2-216
Assembly replacement, A6500 ... 2-196
Assembly replacement, A6600 ... 2-177
Assembly replacement, A9500 ... 2-159
Assembly replacement, A9700 ... 2-219
Audio amplifier module A5400 (receive mode) ... 1-28
Audio amplifier module A5400 (transmit mode) ... 1-45
Audio and squelch preamplifier module A4300 ... 1-28
Audio distortion troubleshooting ... 2-81
Audio frequency response and front panel meter test ... 2-8
Audio level adjustment ... 2-132
Audio mixer module A8600 ... 1-36
Audio power output and distortion test ... 2-6
Audio power troubleshooting ... 2-80
Automatic gain control (agc) ... 1-45

B

Buffer amplifier module A6400 and regulator assembly ... 1-41

C

Carrier squelch adjustment ... 2-134
Carrier squelch sensitivity troubleshooting ... 2-88
Circuit troubleshooting, +16 vdc ... 2-68
Circuit troubleshooting, + 27.5 vdc ... 2-61
Consolidated index of Army publications and blank forms ... 1-2

INDEX (CONT)

Subject	Page
C (CONT)	
Control, radio set C-7088/ARC-131 functioning	1-63
Control unit troubleshooting	2-114
Crs balanced mixer A3200	1-10
Crs first and second if. amplifier A3400/crs third if. amplifier and limiter A3500	1-14
Crs hunt discriminator A3600, crs phase discriminator A3700, and reference oscillator A2000	1-15
Crs second mixer A3300 and crystal switch A2000	1-11
D	
Destruction of Army electronics materiel to prevent enemy use	1-2
Differences between models/silicon versions	1-3
Direct support maintenance procedures	
Control unit C-7088/ARC-131	
Electrical connector J9101 replacement	2-238
Front panel dial mask replacement	2-224
Front panel knobs replacement	2-222
Light panel replacement	2-225
Mode switch S9105 replacement	2-234
Squelch switch S9106 replacement	2-228
Switch and wiring assembly replacement	2-226
Tens frequency selector switch S9101 replacement	2-240
Tenths frequency selector switch S9103 and/or hundredths frequency selector switch S9104 replacement	2-232
Units frequency selector switch S9102 replacement	2-244
Units frequency selector switch S9102 replacement	2-244
Volume control switch R9103 replacement	2-230
General	
Receiver/transmitter, RT-823/ARC-131	
Assembly replacement, A1000	2-214
Assembly replacement, A1000, A2000, A6000, and A9700	2-208
Assembly replacement, A1600	2-221
Assembly replacement, A2000	2-218
Assembly replacement, A2100	2-184
Assembly replacement, A4500	2-182
Assembly replacement, A4900	2-202
Assembly replacement, A6000	2-216
Assembly replacement, A6500	2-196
Assembly replacement, A6600	2-177
Assembly replacement, A9500	2-159
Assembly replacement, A9700	2-219
Front panel replacement	2-185
Homing module A4800 replacement	2-153
Low-pass filter FL4501 replacement	2-205
Modules and assembly replacement, A3000	2-160
Modules and assembly replacement, A4000	2-154
Modules and assembly replacement, A5500	2-166

INDEX (CONT)

Subject	Page
D (CONT)	
Modules and assembly replacement, A8700	2-172
Module replacement, A1100 through A1500	2-186
Module replacement, A6300 and A6400	2-180
Power supply circuit card replacement	2-178
Radio interference filter FL9601 replacement	2-198
Reflectometer and sidetone detector Z4502 replacement	2-204
Relay K3001 replacement	2-220
Relays K4501 through K4504 replacement	2-206
Relays K9601 through K9606 replacement	2-207
RF attenuator and diode switch Z4501 replacement	2-203
RT case replacement	2-152
SQ ADJ switch R9602 replacement	2-194
SQ DIS switch S9602 and XMTR test switch S9603 replacement	2-190
Test meter M9601 replacement	2-189
Test switch S9601 replacement	2-192
Transistor Q9601 replacement	2-200
XMTR HI-LO switch S9604 replacement	2-195
E	
Electrical connector J9101 replacement	2-238
Equipment characteristics, capabilities, and features	1-3
Equipment description	1-3
Differences between models/silicon versions	1-3
Equipment characteristics, capabilities, and features	1-3
F	
First and second if. amplifier A4100	1-26
First and second if. amplifiers module A8300	1-37
First RF amplifier module A1200	1-22
Front panel dial mask replacement	
Front panel knobs replacement	2-222
Front panel replacement	2-185
G	
Gearbox assembly A9700	1-20
Gearbox assembly A9700 alinement	2-130
General information	1-1
Administrative storage	1-2
Consolidated index of Army publications and blank forms	1-2
Destruction of Army electronics materials to prevent enemy use	1-2
Maintenance forms, records, and reports	1-1
Nomenclature cross-reference list	1-2
Reporting equipment improvement recommendations (eir)	1-2
Safety, care, and handling	1-3
Scope	1-1

INDEX (CONT)

Subject	Page
H	
Homer-detector amplifier assembly A4800	1-54
Homing adjustment	2-148
Homing flag indication troubleshooting	2-110
Homing module A4800 replacement	2-153
Homing needle indication troubleshooting	2-111
Homing sensitivity test	2-38
Homing signal flow	1-50
How to use the troubleshooting charts	2-53
Hunt cutoff detector p/o module A4200	1-44
Hunt generator module A8400	1-39
I	
If. attenuator module A4900 (homing mode)	1-53
If. attenuator module A4900 (receive mode)	1-26
Introduction	
Equipment description	1-3
General information	1-1
Principles of operation	1-4
Isolation amplifier module A6600	1-42
L	
Local oscillator aft/crystal reference system	1-8
Local oscillator alinement	2-146
Local oscillator module A1500	1-24
Low-pass filter FL4501 replacement	2-205
Light panel replacement	2-225
M	
Maintenance	
Alinement and adjustment procedures	2-126
Performance tests	2-2
Repair and replacement procedures	2-150
Repair parts, special tools, and TMDE	2-1
Troubleshooting	2-50
Maintenance forms, records, and reports	1-1
Master oscillator frequency control loop	1-33
Master oscillator module A6300	1-40
Maximum signal plus noise-to-noise ratio test	2-14
Maximum signal plus noise-to-noise ratio troubleshooting	2-87, 2-101
Mixer and buffer amplifier A1400 (receive mode)	1-23
Mixer and buffer amplifier A1400 (transmit mode)	1-43
Mode switch S905 replacement	2-234
Mode switch selection and front panel illumination test	2-41

INDEX (CONT)

Subject — Page

M (CONT)

Modulator module A8100, 11.5 MHz 1-36
Module replacement, A1100 through A1500 2-186
Module replacement, A6300 and A6400 2-180
Modules and assembly replacement, A3000 2-160
Modules and assembly replacement, A4000 2-154
Modules and assembly replacement, A5500 2-166
Modules and assembly replacement, A8700 2-172

N

Narrow band deviation adjustment 2-140
No audio output troubleshooting 2-72
Nomenclature cross-reference list 1-2

P

Performance tests
  Control, radio set C-7088/ARC-131
    Mode switch selection and front panel illumination test 2-41
    Retransmit receive test 2-46
    Retransmit transmit test 2-48
    Squelch switch and frequency selection test 2-43
  Homing mode
    Homing sensitivity test 2-38
  Receive mode
    Audiofrequency response and front panel meter test 2-8
    Audio power output and distortion test 2-6
    Maximum signal plus noise-to-noise ratio test 2-14
    Receiver carrier squelch sensitivity test 2-16
    Receiver sensitivity, quieting, and limiting test 2-11
    Receiver tone squelch sensitivity test 2-19
  Transmit mode
    Transmitter automatic frequency selection and channel changing tone test 2-34
    Transmitter deviation narrow band test 2-26
    Transmitter distortion narrow band test 2-28
    Transmitter frequency stability test 2-32
    Transmitter power output test 2-22
    Transmitter sidetone test 2-35
    Transmitter signal plus noise-to-noise ratio test 2-30
  Voltage distribution
    Test meter tests 2-3
Phase discriminator module A8200 1-38
Poor audio response troubleshooting 2-83
Poor sensitivity troubleshooting 2-85
Power supply assembly A9500 1-60
Power supply circuit card replacement 2-178

INDEX (CONT)

Subject	Page
P (CONT)	
Principles of operation	1-4
Homing mode	
Homer-detector amplifier assembly A4800	1-54
Homing signal flow	1-50
If. attenuator module A4900 (homing mode)	1-53
Rf control assembly p/o module A4500 (homing mode)	1-52
Power and control circuits	
Control, radio set C-7088/ARC-131 functioning	1-63
Power supply assembly A9500	1-80
Radio set AN/ARC-131 interunit circuit details	1-68
Receiver-transmitter intraunit circuit functioning	1-61
Tuning system radio set AN/ARC-131	1-78
Vhf tuner power supply module A1600	1-59
Voltage regulator assembly A2100	1-60
Receive mode	
Antenna tuning and protection module A1100	1-22
Audio amplifier module A5400 (receive mode)	1-28
Audio and squelch preamplifier module A4300	1-28
Crs balanced mixer A3200	1-10
Crs first and second if. amplifier A3400/CRS third if. amplifier and limiter A3500	1-14
Crs hunt discriminator A3600, crs phase discriminator A3700, and reference oscillator A2000	1-15
Crs second mixer A3300 and crystal switch A2000	1-11
First and second if. amplifier A4100	1-26
First rf amplifier module A1200	1-22
Gearbox assembly A9700	1-20
If. attenuator module A4900 (receive mode)	1-26
Local oscillator aft/crystal reference system	1-8
Local oscillator module A1500	1-24
Mixer and buffer amplifier A1400 (receive mode)	1-23
Receiver signal flow	1-7
Receiver squelch amplifier module A5200 and squelch filter module A5300 (receive mode)	1-29
Rf control assembly p/o module A4500 (receive mode)	1-21
Second rf amplifier module A1300	1-23
Third, fourth, and fifth if. amplifier, limiter and discriminator A4200	1-27
Time delay circuit p/o module A2100	1-19
Retransmit mode	
Retransmit operation	1-58
Transmit mode	
Audio amplifier module A5400 (transmit mode)	1-45
Audio mixer module A8600	1-36
Automatic gain control (agc)	1-45
Buffer amplifier module A6400 and regulator assembly	1-41
First and second if. amplifiers module A8300	1-37

INDEX (CONT)

Subject — Page

P (CONT)

Hunt cutoff detector p/o module A4200 1-44
Hunt generator module A8400 1-39
Isolation amplifier module A6600 1-42
Master oscillator frequency control group 1-33
Master oscillator module A6300 1-40
Mixer and buffer amplifier A1400 (transmit mode) 1-43
Modulator module A8100, 11.5 MHz 1-36
Phase discriminator module A8200 1-38
Rf amplifier assembly module A6500 1-46
Rf control assembly p/o module A4500 (transmit mode) 1-48
Squelch amplifier module A5200 (transmit mode) 1-45
Transmitter signal flow 1-31

R

Radio interference filter FL9601 replacement 2-198
Radio set AN/ARC-131 interunit circuit details 1-68
Receiver carrier squelch sensitivity test 2-16
Receiver sensitivity adjustments 2-142
Receiver sensitivity, quieting, and limiting test 2-11
Receiver signal flow 1-7
Receiver squelch amplifier module A5200 and squelch filter module A5300 (receive mode) 1-29
Receiver tone squelch sensitivity test 2-19
Receiver-transmitter intraunit circuit functioning 1-61
Reflectometer and sidetone detector Z4502 replacement 2-204
Regulated circuit troubleshooting, +24 vdc 2-64
Relay K3001 replacement 2-220
Relays K4501 through K4504 replacement 2-206
Relays K9601 through K9606 replacement 2-207
Repair parts and tools 2-1
Repair parts, special tools, and TMDE
  Repair parts and tools 2-1
  Special tools and TMDE 2-1
Reporting equipment improvement recommendations (EIR) 1-2
Retransmit operation 1-58
Retransmit receive test 2-46
Retransmit transmit test 2-48
Rf amplifier assembly module A6500 1-46
Rf amplifier assembly A6500 alinement 2-127
Rf attenuator and diode switch Z4501 replacement 2-203
Rf control assembly p/o module A4500 (homing mode) 1-52
Rf control assembly p/o module A4500 (receive mode) 1-21
Rf control assembly p/o module A4500 (transmit mode) 1-48
Rt case replacement 2-152

INDEX (CONT)

Subject	Page
S	
Safety, care, and handling	1-3
Scope	1-1
Second rf amplifier module A1300	1-23
Special tools and TMDE	2-1
SQ ADJ switch R9602 replacement	2-194
SQ DIS switch S9802 and XMTR test switch S9603 replacement	2-190
Squelch amplifier module A5200 (transmit mode)	1-45
Squelch switch and frequency selection test	2-43
Squelch switch S9106 replacement	2-228
Switch and wiring assembly replacement	2-226
T	
Tens frequency selector switch S9101 replacement	2-240
Tenths frequency selector switch S9103 and/or hundredths frequency selector switch S9104 replacement	2-232
TEST METER M9601 replacement	2-189
Test meter tests	2-3
TEST SWITCH S9601 replacement	2-192
Third, fourth, and fifth if. amplifier limiter and discriminator A4200	1-27
Time delay circuit p/o module A2100	1-19
Tone modulation frequency and deviation adjustment, 150 Hz	2-136
Tone squelch adjustment	2-138
Tone squelch sensitivity troubleshooting	2-89
Transistor Q9601 replacement	2-200
Transmitter automatic frequency selection and channel changing tone test	2-34
Transmitter deviation narrow band test	2-26
Transmitter deviation narrow band troubleshooting	2-97
Transmitter distortion narrow band test	2-28
Transmitter distortion narrow band troubleshooting	2-99
Transmitter frequency selection and channel changing tone troubleshooting	2-108
Transmitter frequency stability test	2-32
Transmitter power output (HI) troubleshooting	2-91
Transmitter power output (LO) troubleshooting	2-94
Transmitter power output test	2-22
Transmitter sidetone test	2-35
Transmitter sidetone troubleshooting	2-109
Transmitter signal flow	1-31
Transmitter signal plus noise-to-noise ratio test	2-30
Transmitter tone modulation test	2-24
Transmitter tone modulation troubleshooting	2-95
Troubleshooting	
Control unit troubleshooting	2-114
General	
How to use the troubleshooting charts	
Troubleshooting charts	2-53

INDEX (CONT)

Subject — Page

T (CONT)

Homing mode
- Homing flag indication troubleshooting ... 2-110
- Homing needle indication troubleshooting ... 2-111

Receive mode
- Audio distortion troubleshooting ... 2-81
- Audio power troubleshooting ... 2-80
- Carrier squelch sensitivity troubleshooting ... 2-88
- Maximum signal plus noise-to-noise ratio troubleshooting ... 2-87
- No audio output troubleshooting ... 2-72
- Poor audio response troubleshooting ... 2-83
- Poor sensitivity troubleshooting ... 2-83
- Tone squelch sensitivity troubleshooting ... 2-89

Receiver-transmitter inoperative
- + 16 vdc circuit troubleshooting ... 2-68
- +27.5 vdc circuit troubleshooting ... 2-61
- +24 vdc regulated circuit troubleshooting ... 2-64

Transmit mode
- Automatic frequency selection and channel changing tone troubleshooting ... 2-108
- Maximum signal plus noise-to-noise ratio troubleshooting ... 2-101
- Transmitter deviation narrow band troubleshooting ... 2-97
- Transmitter distortion narrow band troubleshooting ... 2-99
- Transmitter frequency stability troubleshooting ... 2-103
- Transmitter power output (HI) troubleshooting ... 2-91
- Transmitter power output (LO) troubleshooting ... 2-94
- Transmitter sidetone troubleshooting ... 2-189
- Transmitter tone modulation troubleshooting ... 2-95

Troubleshooting charts ... 2-54
Tuning system radio set AN/ARC-131 ... 1-78

U

Units frequency selector switch S9102 replacement ... 2-244

V

Vhf tuner power supply module A1600 ... 1-59
Volume control switch R9103 replacement ... 2-230
Voltage distribution troubleshooting ... 2-56
Voltage regulator assembly A2100 ... 1-60

X

XMTR HI-LO switch S9604 replacement ... 2-195

GLOSSARY

Section 1 ABBREVIATIONS

af	Audio frequency
afc	Automatic frequency control
agc	Automatic gain control
am	Amplitude modulation
crs	Crystal reference system
fm	Frequency modulation
if.	Intermediate frequency
kHz	Kilohertz
MHz	Megahertz
rec	Receive
rf	Radio frequency
rt	Radio-transmitter
xmit	Transmit

Section II DEFINITION OF UNUSUAL TERMS

Attenuate. To reduce signal strength.

Automatic frequency control (aft). A system that produces an error voltage which is proportional to the amount of oscillator drift. The error voltage corrects this drift.

Automatic gain control (age). A system that automatically adjusts the gain of a signal so as to produce a constant level of output power.

Drift. The action of an oscillator whose output frequency varies, even though circuit conditions remain the same.

Limiting. Clipping those portions of a wave that exceed a specific amplitude.

Squelch. To quiet a receiver by cutting off its output when no signal is being received.

RECOMMENDED CHANGES TO EQUIPMENT TECHNICAL PUBLICATIONS

THEN . . JOT DOWN THE DOPE ABOUT IT ON THIS FORM. CAREFULLY TEAR IT OUT. FOLD IT AND DROP IT IN THE MAIL!

SOMETHING WRONG WITH THIS PUBLICATION?

FROM (PRINT YOUR UNIT'S COMPLETE ADDRESS)

Your Mailing Address

DATE SENT

Date you filled out this form

PUBLICATION NUMBER	PUBLICATION DATE	PUBLICATION TITLE
TM 11-5805-486-14/NAVELEX 0967-325-9012/TO 31W2-4-171-1		SWITCHBOARD,TELEPHONE,MANUAL SB-3259/G

BE EXACT PIN-POINT WHERE IT IS

PAGE NO	PARA-GRAPH	FIGURE NO	TABLE NO
2-25	2-28		
3-10	3-3		3-1
5-6	5-8		
		F03	

IN THIS SPACE TELL WHAT IS WRONG AND WHAT SHOULD BE DONE ABOUT IT:

Recommend that the installation antenna alignment procedure be changed throughout to specify a 2° IFF antenna lag rather than 1°.

REASON: Experience has shown that with only a 1° lag, the antenna servo system is too sensitive to wind gusting in excess of 25 knots, and has a tendency to rapidly accelerate and decelerate as it hunts, causing strain to the drive train. Hunting is minimized by adjusting the lag to 2° without degradation of operation.

Item 5, Function column. Change "2 db" to "3db."

REASON: The adjustment procedure the the TRANS POWER FAULT indicator calls for a 3 db (500 watts) adjustment to light the TRANS POWER FAULT indicator.

Add new step f.1 to read, "Replace cover plate removed in step e.1, above."

REASON: To replace the cover plate.

Zone C 3. On J1-2, change "+24 VDC to "+5 VDC."

REASON: This is the output line of the 5 VDC power supply. +24 VDC is the input voltage.

PRINTED NAME GRADE OR TITLE AND TELEPHONE NUMBER

SSG I. M. DeSpiritof 999-1776

SIGN HERE

I. M. DeSpiritof

DA FORM 1 JUL 79 2028-2

PREVIOUS EDITIONS ARE OBSOLETE.

P.S.--IF YOUR OUTFIT WANTS TO KNOW ABOUT YOUR RECOMMENDATION MAKE A CARBON COPY OF THIS AND GIVE IT TO YOUR HEADQUARTERS

TEAR ALONG PERFORATED LINE

REVERSE OF DA FORM 2028-2

FILL IN YOUR UNIT'S ADDRESS

FOLD BACK

DEPARTMENT OF THE ARMY

OFFICIAL BUSINESS
PENALTY FOR PRIVATE USE $300

POSTAGE AND FEES PAID
DEPARTMENT OF THE ARMY
DOD 314

U.S. MAIL

Commander
US Army Communications-Electronics
Command and Fort Monmouth
ATTN: AMSEL-ME-MP
Fort Monmouth, N.J. 07703-5007

SAMPLE

TEAR ALONG PERFORATED LINE

RECOMMENDED CHANGES TO EQUIPMENT TECHNICAL PUBLICATIONS

SOMETHING WRONG WITH THIS PUBLICATION?

FROM: (PRINT YOUR UNIT'S COMPLETE ADDRESS)

DATE SENT

PUBLICATION NUMBER	PUBLICATION DATE	PUBLICATION TITLE
TM 11-5820-670-30	13 Sept 1985	Radio Set AN/ARC-131

BE EXACT . . . PIN-POINT WHERE IT IS

PAGE NO	PARA-GRAPH	FIGURE NO	TABLE NO

IN THIS SPACE TELL WHAT IS WRONG AND WHAT SHOULD BE DONE ABOUT IT:

PRINTED NAME, GRADE OR TITLE, AND TELEPHONE NUMBER

SIGN HERE

DA FORM 1 JUL 79 2028-2

PREVIOUS EDITIONS ARE OBSOLETE.

P S --IF YOUR OUTFIT WANTS TO KNOW ABOUT YOUR RECOMMENDATION MAKE A CARBON COPY OF THIS AND GIVE IT TO YOUR HEADQUARTERS

REVERSE OF DA FORM 2028-2

FILL IN YOUR UNIT'S ADDRESS

FOLD BACK

DEPARTMENT OF THE ARMY

OFFICIAL BUSINESS
PENALTY FOR PRIVATE USE $300

POSTAGE AND FEES PAID
DEPARTMENT OF THE ARMY
DOD 314

U.S. MAIL

TEAR ALONG PERFORATED LINE

Commander
US Army Communications-Electronics
Command and Fort Monmouth
ATTN: AMSEL-ME-MP
Fort Monmouth, N.J. 07703-5007

RECOMMENDED CHANGES TO EQUIPMENT TECHNICAL PUBLICATIONS

SOMETHING WRONG WITH THIS PUBLICATION?

FROM: (PRINT YOUR UNIT'S COMPLETE ADDRESS)

DATE SENT

PUBLICATION NUMBER	PUBLICATION DATE	PUBLICATION TITLE
TM 11-5820-670-30	13 Sept 1985	Radio Set AN/ARC-131

BE EXACT . . . PIN-POINT WHERE IT IS

PAGE NO	PARA-GRAPH	FIGURE NO	TABLE NO

IN THIS SPACE TELL WHAT IS WRONG AND WHAT SHOULD BE DONE ABOUT IT:

PRINTED NAME, GRADE OR TITLE, AND TELEPHONE NUMBER

SIGN HERE

DA FORM 1 JUL 79 **2028-2**

PREVIOUS EDITIONS ARE OBSOLETE.

P S --IF YOUR OUTFIT WANTS TO KNOW ABOUT YOUR RECOMMENDATION MAKE A CARBON COPY OF THIS AND GIVE IT TO YOUR HEADQUARTERS

REVERSE OF DA FORM 2028-2

TEAR ALONG PERFORATED LINE

FILL IN YOUR UNIT'S ADDRESS

FOLD BACK

DEPARTMENT OF THE ARMY

OFFICIAL BUSINESS
PENALTY FOR PRIVATE USE $300

POSTAGE AND FEES PAID
DEPARTMENT OF THE ARMY
DOD 314

U.S. MAIL

Commander
US Army Communications-Electronics
Command and Fort Monmouth
ATTN: AMSEL-ME-MP
Fort Monmouth, N.J. 07703-5007

RECOMMENDED CHANGES TO EQUIPMENT TECHNICAL PUBLICATIONS

SOMETHING WRONG WITH THIS PUBLICATION?

FROM: (PRINT YOUR UNIT'S COMPLETE ADDRESS)

DATE SENT

PUBLICATION NUMBER	PUBLICATION DATE	PUBLICATION TITLE
TM 11-5820-670-30	13 Sept 1985	Radio Set AN/ARC-131

BE EXACT . . . PIN-POINT WHERE IT IS

PAGE NO	PARA-GRAPH	FIGURE NO	TABLE NO

IN THIS SPACE TELL WHAT IS WRONG AND WHAT SHOULD BE DONE ABOUT IT:

PRINTED NAME, GRADE OR TITLE, AND TELEPHONE NUMBER

SIGN HERE

DA FORM 1 JUL 79 **2028-2**

PREVIOUS EDITIONS ARE OBSOLETE.

P S --IF YOUR OUTFIT WANTS TO KNOW ABOUT YOUR RECOMMENDATION MAKE A CARBON COPY OF THIS AND GIVE IT TO YOUR HEADQUARTERS

REVERSE OF DA FORM 2028-2

TEAR ALONG PERFORATED LINE

FILL IN YOUR UNIT'S ADDRESS

FOLD BACK

DEPARTMENT OF THE ARMY

OFFICIAL BUSINESS
PENALTY FOR PRIVATE USE $300

POSTAGE AND FEES PAID
DEPARTMENT OF THE ARMY
DOD 314

U.S. MAIL

Commander
US Army Communications-Electronics
Command and Fort Monmouth
ATTN: AMSEL-ME-MP
Fort Monmouth, N.J. 07703-5007

By Order of the Secretary of the Army:

JOHN A. WICKHAM JR.
General, United States Army
Chief of Staff

Official:

DONALD J. DELANDRO
Brigadier General, United States Army
The Adjutant General

DISTRIBUTION:
To be distributed in accordance with DA Form 12-36 literature requirements for AN/ARC-131.

☆ U.S. GOVERNMENT PRINTING OFFICE : 1989 : 0 - 242-451 (5888)

This fine document...

Was brought to you by me:

Liberated Manuals -- free army and government manuals

Why do I do it? I am tired of sleazy CD-ROM sellers, who take publicly available information, slap “watermarks” and other junk on it, and sell it. Those masters of search engine manipulation make sure that their sites that sell free information, come up first in search engines. They did not create it... They did not even scan it... Why should they get your money? Why are not letting you give those free manuals to your friends?

I am setting this document FREE. This document was made by the US Government and is NOT protected by Copyright. Feel free to share, republish, sell and so on.

I am not asking you for donations, fees or handouts. If you can, please provide a link to liberatedmanuals.com, so that free manuals come up first in search engines:

<A HREF=http://www.liberatedmanuals.com/>Free Military and Government Manuals</A>

– Sincerely
  Igor Chudov
  http://igor.chudov.com/